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The findings, recommendations, and conclusions of a policy-oriented, multi-disciplinary study of copyright in computer-readable works are reported. The foundations of copyright are examined for basic principles, and the theory of public goods is applied to develop the rationale for copyright protection. The judicial history of copyright in the twentieth century is reviewed with respect to advances in information technology. The impact of technological change on judicial decision-making in copyright is analyzed. The problem of transaction costs in the marketplace for copyrighted works is examined, and methods for the reduction of such costs are described. Models of policymaking are developed which clarify the roles of interest groups and the branches of Government. Recommendations on the conditions of copyrightability for computer-readable data bases and computer programs are presented and are based on findings of basic principles developed during the study and described in the report. (Author)

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ED149733

COMPUTER SCIENCE & TECHNOLOGY:

Copyright in Computer-Readable Works: Policy Impacts of Technological Change

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U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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ABSTRACT

The findings, recommendations, and conclusions of a policy-oriented, multi-disciplinary study of copyright in computer-readable works are reported.

The foundations of copyright are examined for basic principles, and the theory of public goods is applied to develop the rationale for copyright protection. The judicial history of copyright in the twentieth century is reviewed with respect to advances in information technology. The impact of technological change on judicial decision-making in copyright is analyzed.

The problem of transaction costs in the marketplace for copyrighted works is examined and methods for the reduction of such costs are described. Models of policymaking are developed which clarify the roles of interest groups and the branches of Government, demonstrating their interactions and providing insights into possible futures.

Recommendations on the conditions of copyrightability for computer-readable data bases and computer programs are presented and are based on findings of basic principles developed during the study and described in the report.

Key Words: Computer; computer program; copyright; data base; economic efficiency; information technology; policy analysis; policymaking; public goods; technological change; transaction costs.

NOTE

The conclusions and recommendations of this report on the copyrightability of computer-readable data bases and computer programs are in no way intended to imply the copyrightability of any work of the United States Government excluded by law from such protection.

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Roy G. Saltman
Project Director

COPYRIGHT IN COMPUTER-READABLE WORKS: POLICY IMPACTS OF TECHNOLOGICAL CHANGE

TABLE OF CONTENTS

		PAGE
1.	EXECUTIVE SUMMARY AND CONCLUSIONS	1
1.1	Origin of This Study	1
1.2	Content of This Report	1
1.3	Findings of Basic Principles	2
1.4	Recommendations for Implementation	3
1.4.1	Computer-Readable Data Bases	3
1.4.2	Computer Programs	3
1.4.3	Transfer of Ownership of Copies of Computer-Readable Works	4
1.5	Conclusions	5
1.5.1	Technological Change and Copyright	5
1.5.2	Judicial Decisionmaking Under Technological Change	5
1.5.3	Models of Copyright Policymaking	6
1.5.4	Economic Efficiency	6
1.6	Recommendations for Further Investigations	7
2.	THE FOUNDATIONS OF COPYRIGHT	9
2.1	Common Law and the Principle of Natural Equity	9
2.2	National Uniformity in the Face of Mobility	10
2.3	Private Actions in the Public Interest	11
2.4	Market Failures and Public Goods	11
2.5	Protection for Publication as Well as Creation	12
2.6	The Value Judgment of Copyright	12
2.7	Summary	13
3.	SOME LANDMARKS OF TECHNOLOGY-CONDITIONED COPYRIGHT POLICYMAKING	15
3.1	Early Historical Activities	15
3.2	Copyright in Sound Recordings	15
3.2.1	Copyrighted Music in Sound Tracks	17
3.2.2	Educational and Library Reproduction of Phonorecords	17
3.3	Copyright in Motion Pictures	17
3.3.1	Sound Tracks in Motion Pictures	18

3.4 Radio and Television Broadcasting. 19

3.4.1 Retransmissions of Broadcasts 20

3.5 Copyright in Cable Television Retransmissions. 21
3.6 Copyright in Photocopies 23

3.6.1 Williams & Wilkins v. United States 24
3.6.2 The 1976 General Revision 25
3.6.3 Current Situation 26

3.7 Copyright in Micromedia and Videotape. 26
3.8 The Establishment of CONTU 26
3.9 Summary. 28

4. TOWARDS AN EFFICIENT MARKETPLACE FOR COPYRIGHTED WORKS. 30

4.1 The Problem of Transaction Costs 30
4.2 The Question of Enforcement. 31

4.2.1 Transaction Costs Even if No Copyright. 31
4.2.2 The Optimal Level of Enforcement and Its Consequences. 32

4.3 The Design of Royalty Collection Systems 34

4.3.1 A Comparison of Types of Licenses 34
4.3.2 Examples of Existing Clearinghouses 35

4.4 Royalty Pricing Schemes. 36

4.4.1 Individual and Institutional Users. 36
4.4.2 Services with High Fixed Costs. 37

4.5 Fair Use as an Economic Concept. 37
4.6 Price Setting for Compulsory Licenses. 38

4.6.1 The Phonorecord Manufacturing License, 1976 Act . . 38
4.6.2 Jukebox Performance Royalty, 1976 Act 39
4.6.3 New Statutory Compulsory Licenses 39
4.6.4 The Copyright Royalty Tribunal. 40

4.7 Copyright and Monopoly 40

4.7.1 Government Remedies for Market Monopoly 41

4.8 Summary. 42

5. COPYRIGHT IN COMPUTER-READABLE WORKS. 44

5.1 Technology Forecasting, 1967 Style 44

5.1.1 Technology of the Future, Updated 46

5.2 Some Technical Issues in the Hearings, 1967. 47
5.3 Current Status, 1976 General Revision. 48
5.4 The Implications of Abolishment of Common Law Protection 49
5.5 Registration and Disclosure. 50

5.5.1 The Extent of Disclosure Requirements 51
5.5.2 The Policy Implications of Disclosure Rules 51

5.6 Copyright in Computer-Readable Data Bases. 52

5.6.1 Publication Only in Computer-Readable Form. 53
5.6.1.1 Display Only, Single Licensee. 54
5.6.1.2 Printouts at Terminals 54
5.6.1.3 Identity of the Publication. 54
5.6.1.4 Needed Clarifications. 55
5.6.2 Statutory Deposit to the Library of Congress. . . . 55
5.6.3 The Question of Monopoly. 56

5.7 Copyright in Computer Programs 58

5.7.1 The Program as the Writing of an Author 59
5.7.2 Computer Programs and Literary Works. 61
5.7.3 Originality of Computer Programs. 61
5.7.4 Protection of Object Code as a Computer Program . . 62
5.7.5 Translation to a New Source Language. 63
5.7.6 Value of Copyright Protection 63
5.7.7 Copyright and Software Industry Strength. 64
5.7.8 Duration of Copyright Protection. 64
5.7.9 User Rights in Computer-Readable Works. 65

5.8 Improving Salability of Computer-Readable Works. 65

5.8.1 The Right to Ephemeral Recordings 65
5.8.2 The Right to Make and Use Machine Code. 66
5.8.3 Differential Pricing. 66
5.8.4 Data Base Access Services 67

5.9 Summary. 67

6. POLICYMAKING FOR COPYRIGHT. 69

6.1 Copyright and Other Property Rights. 69
6.2 Applicable Decisionmaking Models 70

6.2.1 Pluralism 70
6.2.2 The Power Arena Model 71

6.3 The Impact of Technological Change 73
6.4 The Public Interest and Computer-Readable Works. 74

REFERENCES. 76

ILLUSTRATION

Figure 1-The "Optimal" Level of Copyright Enforcement 33

APPENDICES

TABLE OF CONTENTS PAGE

Appendix A: Impact of Information Technology on Copyright Law in the Use of Computerized Scientific and Technological Information Systems, by CRC Systems, Incorporated, Vienna, VA A-1

Appendix B: The Role of Transaction Costs in the Design of Royalty Pricing Schemes for STI, by Y. M. Braunstein and J. A. Ordover, New York University B-1

Appendix C1: On the Optimal Provision of Journals Qua Excludable Public Goods: Summary and Major Findings, by J. A. Ordover and R. D. Willig, New York University and Bell Laboratories C1-1

Appendix C2: On the Optimal Provision of Journals Qua Excludable Public Goods (full text), by J. A. Ordover and R. D. Willig, New York University and Bell Laboratories. C2-1

Appendix D: The Role of Copyright Protection and Optimal Pricing in Computerized STI Systems, by Y. M. Braunstein, New York University D-1

1. EXECUTIVE SUMMARY AND CONCLUSIONS

1.1 ORIGIN OF THIS STUDY

This study began in October, 1974, and has been sponsored by the Division of Science Information of the National Science Foundation. The problem seen at that time was that copyrighted works were being fixed in computer-readable media and the copyright law concerning the use of such works was unclear. The copyright law had not been fully revised since 1909, a time when the possibility of copies of literature fixed in media that would make the copies invisible to the unaided eye was unthinkable.

A major issue in 1974 and for several previous years was whether a copyright owner deserved compensation when his work was first encoded into electronic form, or for the time it continued to be stored, or only upon each instance of a hard-copy being created. In addition, a sense of urgency had been created at Congressional hearings in 1967 with predictions that in the near future, hard copy distribution of technical books and scientific journals would be replaced by a single copy, converted into computerized form, being replicated at hundreds, perhaps thousands of remote terminals. The implications for copyright owners were severe. As a result of those conditions, what was desired was a multi-disciplinary, "policy-oriented" study which would clarify the issues, including the issue of economically-sound, technical mechanisms in such automated systems that would enable reporting of the data on which royalties could be based.

However, the National Commission on New Technological Uses of Copyrighted Works (CONTU) was established at the very end of 1974, with the function of recommending to Congress changes in the copyright law with respect to uses of copyrighted works in conjunction with computers. In October, 1976, the General Revision of Copyright Law was enacted, which did much to clarify the rights of copyright owners to their works when fixed in any tangible medium, but did not finally resolve the issues of computer-readable works.

CONTU has not yet submitted its recommendations to Congress, and the copyright laws with respect to computer-readable works will remain ambiguous until Congress acts on those forthcoming recommendations.

This study analyzes the issues of copyright in computer-readable works and is pertinent to current policy considerations.

1.2 CONTENT OF THIS REPORT

The purpose of this report is to present the results of the study, and to recommend mechanisms that will maximize the long-term availability of computer-based information.

The subject of this study does not concern an activity in which there

is a comprehensive or coordinated investment program aimed at achieving a specific goal. Consequently, recommendations are not based on a quantification of benefits and a resulting cost-benefit comparison. In order to establish a firm basis for recommendations, basic principles of copyright have been surveyed; and an analysis has been made of the impact of information technology on copyright law as that technology has advanced during the twentieth century. In addition, fundamental concepts of economics have been reviewed to assure that recommendations are well-grounded in that discipline.

As an outcome of the evaluation of fundamentals, and of the historical analyses, it has been possible to enumerate a set of basic principles that are employed as the foundation of the recommendations. In addition, insights have been developed and conclusions drawn about the reduction of transaction costs, the impact of technological change and about the existing and expected mechanisms of policymaking in copyright. It is hoped that the recommendations and conclusions will be of value to decisionmakers, as well as to policy analysts and researchers. Certainly the findings, conclusions and recommendations of this report are not to be taken as the final, definitive view. Other analyses of the legal and historical precedents may reveal different interpretations and consequently different conclusions and recommendations. Additional contributions to the literature are welcomed.

1.3 FINDINGS OF BASIC PRINCIPLES

1. The concept of common law copyright conforms to the philosophy of the Enlightenment, enunciated by Locke, that each person has the right to the fruits of his creations.

2. Due to the inherent rights in the copy, an intrinsic market failure results from the ease of copying or plagiarism of intellectual property. Correction of the failure requires the public good of statutory copyright protection.

3. The principle of inherent ownership and consequent statutory protection do not imply a value judgment as to the relative merit of an individual work or the inherent right to financial remuneration. The economic value of a work is to be determined in the marketplace where copyright protects the distributors of intellectual works as well as the creators.

4. If free economic competition is possible, opportunities for it should be maximized, including opportunities for entry of new products and new competitors.

5. Copyright protection assumes the concept of the *quid pro quo* of a social contract. The application of this concept requires that in return for protection of law, the copyright holder makes a public disclosure of his work.

6. The dissemination of scientific and technical information should be maximized, subject to resource constraints, excepting where such principles as personal privacy, trade secrecy and national security take precedence.

7. There would be transaction costs attached to any market, including the market for intellectual property, even if there were no copyright protection. The trade-off in structuring a market is in the kinds of transaction costs a society is willing to tolerate, as well as in the size of such costs. All other things being equal, the size of transaction costs should be minimized.

8. Decisionmaking on copyright involves the achievement of a balance of equities between user needs and owner rights that should include consideration of the general public as well.

1.4 RECOMMENDATIONS FOR IMPLEMENTATION

1.4.1 Computer-Readable Data Bases

1. Computer-readable data bases, whether compilations, collective works, or reference works of a single author should be copyrightable in any tangible medium of expression.

2. Complete disclosure of the contents of the data base to the Copyright Office should be required, in some tangible medium, when the data base is initially registered.

3. Deposit requirements for data-base updating should be satisfied by a yearly submission of a complete list of additions and deletions. At some multi-year interval, e.g. ten years, a complete re-disclosure should be made if the data base has been frequently updated.

4. Clarification of what constitutes publication of a data base is needed when a data base is distributed only in computer-readable form via a terminal query system through one or a very few specifically-licensed computer systems.

1.4.2 Computer Programs

1. A computer program written by a person in a source language, with or without the assistance of a computer, generically qualifies as a work of authorship. An original computer program should be copyrightable in source language in any tangible medium of expression. Machine (object) code should not qualify as a source language.

2. Disclosure of the computer program upon copyright registration should be accompanied by definition and usage manuals for the computer language and dialect in which the program is written, if such information is not on file already with the Copyright

Office.

3. The transformation of a copyrighted computer program into object code from source language should be considered to be the making of a copy, even if the translation requires the implementation of some housekeeping functions such as the selection of peripheral units, storage allocation and the assignment of absolute addresses.

4. The translation of a copyrighted computer program into a completely different source language (not just a dialect or variant) should constitute the authorship of a derivative work.

5. The duration of copyright protection for computer programs should be no less than the duration of protection of other original works of authorship, in order to promote the use of computer languages that can be expected to endure regardless of changes in hardware technology.

6. Decisionmakers should be aware that assignment of computer programs to a particular category of copyrighted work forces the adoption of the limitations on exclusive rights already inherent in that category. For example, categorization of a computer program as a "literary work", rather than as a separate copyrightable category assigns to computer program users the exemptions to exclusive rights granted to users of literary works in Section 110 of the 1976 General Revision of Copyright Law.

7. The flowchart of a computer program ought to be separately copyrightable as a pictorial work, but it ought not to be able to employed to support an infringement charge against another program that employs the same flowchart unless the flowchart is sufficiently detailed so as to mirror the specific expression of the original program.

1.4.3 Transfer of Ownership of Copies of Computer-Readable Works

1. Outright sale of computer-readable works, i.e. transfer of ownership of copies as distinguished from lease or rental with permissions, should be promoted so as to reduce transaction costs.

2. In order to effectively use a copyrighted computer-readable work, an owner of a copy should have the right to make and retain additional copies for his internal use (which would have to be destroyed when and if he resold the work), and should have the right to use a copy in a computer. The right of internal use should not include the right to make the work available to outsiders via a computer network or otherwise. The assignment of usage rights to purchasers should not prevent

copyright owners from retaining all exclusive rights in situations not involving transfer of ownership of copies.

1.5 CONCLUSIONS

1.5.1 Technological Change and Copyright

1. An essential point at issue, as seen by decisionmakers in copyright policymaking, is the definition of the boundaries of the property right, regardless of the specific technologies involved.

2. A major effect of technological change is that it causes ambiguities in some of the definitions of property rights that may have seemed perfectly clear before the change.

3. An effect of successful technological change is a multiplication of interest groups organized around the new technologies. The increase in number of interest groups causes an increased incidence of inter-group conflict. This often results in additional rules as well as more complex rules regulating group interactions.

4. It seems inescapable that "a complex civilization necessarily develops complex political arrangements" if each interest group is granted a certain legitimacy through a democratic process.

1.5.2 Judicial Decisionmaking Under Technological Change

1. One viewpoint taken by the Federal Courts in copyright litigation is that if the general concept of the law then in effect can be extended to the new situation without stretching the law's meaning too far, it should be done. This interpretation is more likely to be employed when the decision so taken will not extend much beyond the boundaries of the specific case at hand, that is, will not affect the balance among interest groups.

2. A second viewpoint is that stretching the law's meaning (or specifically defining the ambiguous) beyond a certain point would be for the Federal Courts to take on a responsibility better left to Congress. This viewpoint is more likely to be taken in a situation in which a decision has ramifications beyond the particular litigants, i.e., affects the balance among interest groups.

3. In taking the second viewpoint, the Courts apparently recognize that Congress is much more capable of implementing a flexible solution involving give and take among interest groups, while the Courts are simply required to give a right-wrong solution. Therefore, it appears that the Courts have decided these cases

in favor of the side upholding the status quo, so that Congress can receive the situation without the effect of an unbalancing Court decision.

1.5.3 Models of Copyright Policymaking

1. Decisionmaking in copyright in the twentieth century has been essentially a pluralist process, that is, has consisted of compromises among various interest groups gathered around different functions related to copyrighted works.

2. The power arena model of Theodore Lowi which assigns decisions to the distributional, regulatory or redistributional arenas is a useful vehicle with which to examine copyright policymaking.

3. Individual copyrights may be the ultimate distributional good, since they can be dispensed in small units, and since registration of copyrights does not reduce the stock of unregistered or uncopyrighted works waiting for claimants. Originality is an unlimited resource, although nurturing and institutionalizing originality may not be.

4. The effect of technological change has been, in Lowi's terms, to move copyright policymaking from the distributional arena (in the nineteenth century) to the regulatory arena (primarily in the twentieth century). The regulatory arena is very close in concept to the pluralist model of policymaking.

5. As long as copyright continues to be seen mainly as a problem of "balancing the equities" (i.e., in the regulatory arena), Congress will retain the major role vis-a-vis the Executive Branch.

6. Increasing concern for consumer welfare and for prevention of monopoly are indicative of redistributional concern and with the potential for increased Executive Branch involvement.

7. While not apparent at present, it is conceivable that changes in prices of raw materials (such as paper) and other resources, as well as technological change, may serve to bring copyright more significantly into the redistributive arena; but probably as part of a more encompassing and consumer-related issue, such as "public access to information."

1.5.4 Economic Efficiency

1. Clearinghouses are useful multi-producer organizations for reducing the transaction costs of information and communication in the collection and payment of royalties for a permission system, but there may be a blurring of individual proprietor considerations.

2. The selection of blanket or per-use licenses on a least-cost basis in a permissions system may be technologically determined. For example, a computerized system of data base access is likely to develop usage information at low cost. In that situation, per-use calculation of royalties is not difficult.

3. With high data-collection costs of usage information, a blanket license is likely to result in lower overhead costs than a per-use license, provided the less-precise information available from the reduced data collection does not result in inequitable treatment of some of the concerned parties.

4. Price differentials in subscription charges between individual purchasers of journals and institutional purchasers are economically justified on efficiency criteria. This concept can be applied to computer-readable works that are sold, as it has been to journals.

5. The exemption from royalty payments for "worthy" users is inefficient because it forces the "less worthy" users to carry more than their share. On efficiency criteria, "worthy" use is public good which should be paid for by everyone.

6. Whether a copyright is an exercisable economic monopoly depends on the substitutability of other copyrighted works as determined by the actions of consumers of such works.

7. Since a researcher must be comprehensive in the literature of his field, there may be very little substitutability among works he must have.

8. The possibility exists that in some field of research, by virtue of economy of scale, an established system of suppliers and customers and already amortized costs of market entry, a single organization may achieve a virtual market monopoly over a class of nonsubstitutable computer-readable data bases.

9. If there were no copyright protection at all, there would still be the transaction costs of increased secrecy, cut-throat competition, and lowered opportunity for recognition of creative talents.

1.6 RECOMMENDATIONS FOR FURTHER INVESTIGATIONS

1. The potential for monopoly in the delivery of computer-readable data-base access services, as discussed above and in Section 5.6.3, may be an area of useful additional investigation. There is a need to consider the fostering of useful innovations as well as the potential for monopoly pricing.

2. The effectiveness of discovery of infringements in the copying

and unauthorized sale and use of computer-readable works may need study. The question of the practical value of copyright protection can be raised if significant infringements can be shown to be occurring without discovery, prosecution and conviction.

3. New types of technologically-based intellectual property may be invented and new copyright problems may arise. Continuing review of inventions and innovations might be undertaken to examine the possibility of the need for further changes in the copyright statute.

4. The electronic journal, while strongly forecasted by some, has not materialized. A useful study would be a consumer-oriented (user-pull) survey, determining to what extent such a product would be acceptable and purchased by potential users.

5. The "worthy use" exemption from copyright royalty payments has been suggested to be economically inefficient. It could be hypothesized that innovations of intellectual products serving the market in which there is a worthy-use exemption would be stifled because of the potential for lesser returns. It would be useful to examine this hypothesis in a research project.

6. Additional examination of whether it would serve the public interest if computer programs were protected under a more-encompassing concept than copyright appears to be worthwhile.

7. While the concept of price descrimination between individual and institutional purchasers of scientific and technical information has been shown to be economically efficient, the legal ramifications controlling its use have not been examined in this report. Such an examination may prove valuable.

2. THE FOUNDATIONS OF COPYRIGHT

2.1 COMMON LAW AND THE PRINCIPLE OF NATURAL EQUITY

Article I, Section 8 of our Constitution gives to Congress the power

> "To promote the progress of science and the useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries;..."

The extant documents that might describe for us the original basis used by the framers of the Constitution for inclusion of this clause are very limited. The Federalist, written in 1787 and 1788 by Alexander Hamilton, James Madison, and John Jay in an effort to explain, defend and obtain support for the ratification by the States of the then-pending Constitution devotes just five sentences to the clause. In Federalist No. 43, James Madison wrote:

> "The utility of this power [of Congress] will scarcely be questioned. The copyright of authors has been solemnly adjudged in Great Britain to be a right of common law. The right to useful inventions seems with equal reason to belong to the inventors. The public good fully coincides in both cases with the claims of individuals. The States cannot make effectual provision for either of the cases, and most of them have anticipated the decision of this point by laws passed at the instance of Congress."

Into Madison's short sentences are packed a wealth of social, economic and political philosophy. In his statement that "copyright of authors has been solemnly adjudged in Great Britain to be a right of common law," Madison implied that basic principles of British common law were valuable, and in addition, continued in effect in the United States; at that time newly-formed out of British colonies. Walter Pforzheimer, in a scholarly historical review of copyright law, has similarly quoted an 1807 Massachusetts decision as stating:

> "Our ancestors, when they came into this new world, claimed the common law as their birth-right, and brought it with them, except such parts as were judged inapplicable to their new state and condition."[1]

Professor Emmette Redford, in describing our legal and ideological heritage, has noted that "...early English judges looked not alone to custom, but also to reason and natural equity for their decisions."[2] Thus, by citing British common law, Madison implied principles of natural justice which included the concept that each person has an inherent right to control of the products of his own creation.

The philosopher most associated with this principle and whose writings

would have been known to Madison was Englishman John Locke (1632-1704). Locke has been called "first advocate of the modern conception of civil liberties and definer of the limitations of property and the powers of the common wealth...the formulator of constitutional law and the democratic processes as we know them."[3] Locke had written, in his Second Treatise on Civil Government, (Chapter V, para. 27):

> "...every man has a property in his own person...The labor of his body and the work of his hands we may say are properly his...It being by him removed from the common state nature placed it in, it hath by his labor something annexed to it that excludes the common right of other men..."

It is useful to note at this point that common law copyright in all unpublished works (with its basis in the British common law to which Madison referred) will continue to be in force in the United States through December 31, 1977. Pforzheimer notes that a principle of British common law that has been carried down to us, and is in effect at this time, is that the author has complete dominion over his work until publication, after which his rights conform to the statute then in effect. The case of Donaldson v. Becket decided in 1774 in Great Britain confirmed this situation.[4]

However, on January 1, 1978, the 1976 General Revision of Copyright Law takes effect, and under this new statute, common law copyright is ended for all unpublished works fixed in any tangible medium of expression. As of that date, such works will be covered by the Federal copyright statute and will not be subject to the common law or statutes of any State.[5] Works not fixed in any tangible medium such as unscripted utterances or performances will continue to be subject to common law as interpreted by the Judiciary.

2.2 NATIONAL UNIFORMITY IN THE FACE OF MOBILITY

In calling in The Federalist for a Federal copyright law, as opposed to a set of State laws, Madison recognized the natural mobility of information (recently proclaimed by some to a 20th century concept) and the inefficiency of different requirements for intellectual property rights in the separate States. Professor Redford has noted that this attempt at uniformity was part of an overall pattern of Constitutional provisions that had a strong economic impact. As Redford states:

> "/The framers of the Constitution/ made certain decisions that were necessary to allow the free flow of persons, investment money, and commerce over the nation as a whole, thus opening a vast area and a vast market to the entrepreneurial genius of Americans, wherever located . . . /The framers/ made possible national uniformity in certain facilities for commerce, such as coinage, patents and copyrights, uniform weights and measures, and a postal system."[6]

2.3 PRIVATE ACTIONS IN THE PUBLIC INTEREST

Finally, in asserting in The Federalist that "the public good fully coincides . . . with the claims of individuals [for copyright and patent protection]" Madison made a bold statement with profound economic as well as political implications. The statement implies, first, that there exists a "public good" that is distinct and separate from individual or private goods. Second, it is implied that the Government may grant incentive benefits or remuneration to individuals for private and voluntary activities that are consistent with the public good. Third, in the cases of patents and copyrights, the private benefits to be granted by the Government will have no public effects except good effects; and fourth, the value of benefits granted is equivalent to the public good thereby obtained.

These implications raise issues that even today, have not been fully analyzed and may never be fully resolved. They are in the arena of what has been referred to as the theory of public goods or public expenditure analysis, but which Professor Peter Steiner has broadened to call "the theory of the public interest."[7] These economic theories "concern the way in which demands for public activity arise, are articulated, and are legitimatized."[8] The theories include the definition and classification of public goods and the mechanisms of their creation, financing, and distribution. In the case of intellectual property, the specific public good is the protection offered to copyright proprietors by the Government through its registration and enforcement mechanisms. Note that the Government protection is the public good; the individually-held copyright is a private asset.

2.4 MARKET FAILURES AND PUBLIC GOODS

Public goods may be differentiated in general from private goods and from collective goods. The necessity for public provision of a good may arise because the technical nature of the good is such that a private market, however perfectly competitive, would not be able to provide it.

The need for a public good may arise also if the imperfections of a real market create public "bads" (e.g., an externality, for example, pollution) which only Government action can cause to correct. In either case, "market failure" is said to occur. If some group of persons acting together take cognizance of the inability of the market to supply the good and provide the good for themselves outside of the free market activity, a collective good results. "Any publicly-induced or provided collective good is a public good,"[9] according to Steiner.

In the case of copyright protection, a conventional economic analysis would state that the need for a public good arises because intrinsic technical characteristics of an intellectual work prevents the operation of the perfectly competitive market for such works without Government intervention. One technical characteristic is simply that an original authored work fixed in any tangible medium of expression (i.e., a

copyrightable work) is typically reproducible at a very low cost in the same or similar medium. The work is also subject to plagiarism. In the presence of these technical facts, and with the condition that the author or his assignees have a property right in the work, a market failure would result without the protection and enforcement power of the Government. The market failure is that without copyright protection the author or rights proprietor would not be able to fully appropriate the economic value of originality through sale.

2.5 PROTECTION FOR PUBLICATION AS WELL AS CREATION

The conventional economic analysis given above has been discussed in a perceptive paper on "The Economic Rationale of Copyright"[10] by Professors Robert M. Hurt and Robert M. Schuchman. One question these authors ask is: "Does the copyright system induce the creation of new goods which would not have been created in the absence of copyrights?"[11] The authors answer that "copyright does lead to the creation of new goods by encouraging the assumption of greater risks."[12]

It is necessary to comment, however, (as Hurt and Schuchman imply) that many kinds of works are subject to copyright, and the importance of copyright for the creation of new works varies with the type of work. In particular, for scientific and technical research papers, copyright is typically of minor importance to the authors of such papers even though publication is very important to them. The remuneration to authors of research papers occurs indirectly through increased salary, improved job security, prizes, travel opportunities and prestige, but not typically from the sale of papers.

However, copyright is extremely important to the publishers of such papers because (as is pointed out in Appendix B of this report), copyright protects the publishers' opportunities to cover their fixed costs. Thus in the case of research papers, copyright does not lead directly to the creation of new goods, but rather to the direct protection of channels of publication for already-existing goods. (This may lead, as a secondary effect, to the further creation of new goods of a similar type for distribution through the protected publication channels.)

2.6 THE VALUE JUDGMENT OF COPYRIGHT

Under the assumption, then, that copyright increases the creation and/or publication of some original works of authorship, Hurt and Schuchman then inquire "whether the reallocation of resources induced thereby is conducive to general welfare."[13] One argument is that copyright encourages literature, which like education, has greater intrinsic merit than its alternative product. Thus social welfare in enhanced. Hurt and Schuchman state that this assumption is in the nature of a value judgment. This is undeniable. It may be noted, in addition, that such a judgment was conceivably in the minds of the Constitution ratifiers who voted "to promote the progress of science and the useful arts" without conclusive proof that copyright protection (along with patent protection) was the most economically efficient or socially equitable method of

pursuing that goal.

However, the Judiciary has held that this Constitutional qualification is explanatory and not prescriptive; and that a copyrighted work need not specifically promote anything as publicly valuable as science or the useful arts, however those terms might have been defined in the 18th century or are defined in the 20th. At present, the judgment of (U.S.) society is, as expressed in law, that any "original works of authorship fixed in any tangible medium of expression "[14] that are accepted for copyright protection are more valuable than the alternatives, whatever they might be.

Furthermore, copyright protection provides society with no comparative value judgment as to the inherent worth of a particular work of authorship; although the availability of copyright may be a Lockean/Madisonian judgment that all such works are qualitatively worth something. Copyright protection is primarily a mechanism designed to correct a flaw or failure in the competitive economic market. As such, it carries no intrinsic predetermined dollar value for any work so protected. It may be, therefore, that "copyright seems to be an inefficient device for simply rewarding authors"[15] as Hurt and Schuchman suggest, but specific financial reward for an individual never has been shown to be the function of copyright. Copyright is directly pertinent to the market for works, and certainly pertinent to the rights of authors, but secondary to authors' specific income. Although copyright protection makes possible a certain monetary compensation for all those involved on the producer side of the economic market for works of authorship, remuneration occurs only to the extent of the revenue that can be obtained from the set of costs, prices, and quantities of sale that market conditions permit. As persons of uncommon taste or strongly-held belief can attest, market prices and revenues rarely reflect an individual's sense of basic priorities or fundamental values. The just rewards to the creators of intellectual works of lasting value that advance the state of civilization will not be through the market mechanism, however protected, by copyright or otherwise.

2.7 SUMMARY

This chapter has provided a background in the foundations of copyright, both ideological and economic. It has considered the question of who gains from copyright protection and the extent, if any, of value judgment in copyright.

The ideological basis for copyright has been shown to be closely related to the concept that each person has the right to control the products of his own creation. This natural right evolved into common law copyright in Great Britain; and the limitations of the protection inherent there was part of the rationale for the Copyright Clause in the Constitution.

Because of the rights of the creator or his assignees, a technical failure exists in the market for intellectual property. The technical

failure, which is the ease of misappropriation through copying or plagiarism, is corrected through a public good, the Government protection of copyright. Note that if there were no inherent right in the copy, there could be no misappropriation, and consequently no implicit market failure. Thus, there would be no reason for Government intervention in the free market.

Copyright is of importance to the publisher as well as the author. This is particularly true in the case of scientific journals. However, the fact of copyright carries with it no comparative value judgment of works so protected. The economic worth of a work is determined in the marketplace where remuneration for the author and/or publisher may (or may not) be obtained. Copyright is not a financial subsidy for authors nor was it ever meant to be. It is a tool through which an author or his assignees may earn an income in the marketplace, if they so choose to use the tool in that manner.

3. SOME LANDMARKS OF TECHNOLOGY-CONDITIONED COPYRIGHT POLICYMAKING

3.1 EARLY HISTORICAL ACTIVITIES

The Constitution was declared in effect on March 4, 1789, having been ratified by the minimum nine States and two others by that time. The first U.S. Congress began regular sessions on April 6, 1789 and the Copyright Act of 1790 was adopted on May 31 of that year.[16] Maps, charts, and books were covered by the first Act. The very early adoption of a Copyright Act may be indicative of the general inclinations of the members of our first Federal government towards the pursuit of knowledge for its practical implications. A less practical, more esthetic class of work, prints, were protected in 1802, although Taubman states that the art of the engraver had been protected in England by 1735.[17] Musical compositions embodied as sheet music were added as a protected class in the general copyright revision of 1831. Photographs were added by the Act of 1865 and works of fine arts were enumerated in the second general copyright revision in 1870.

The adaption of the copyright laws to the technologies of the twentieth century (except for computer technology) is detailed in Appendix A, Chapter A.2 of this report. Much of the following part of this chapter is essentially a summary of that material. Special organization and additional information and interpretation have been added to clarify and elucidate certain concepts.

3.2 COPYRIGHT IN SOUND RECORDINGS

This technology is considered first because of the early consideration by the Supreme Court of a principle that was to have effect on thinking about copyright, even with respect to other technologies, until 1976.

The essential question at issue before the Supreme Court in the 1908 case of White-Smith Music Publishing Co. v. Apollo Co. was whether a perforated piano roll constituted a "copy" of sheet music. Now a piano roll, which is simply a cylinder of hard material with holes in it, is a sound recording, as that term is understood today. True, music is only heard when the piano roll is used together with a properly-instrumented piano, but the analogy with a phonograph record or magnetic tape is clear. Neither of those latter recording media contain sounds either; they contain grooves or altered magnetic domains. When a record or tape is used together with properly-instrumented equipment, the intended music is heard; and it cannot be heard from the recording without that equipment or other equipment performing the same function. In effect, the piano used with the piano roll is the playback equipment.

However, sound recordings were not a protected class in 1908 and the Supreme Court decided in White-Smith that the definition of a copy of a musical composition was "a written or printed record of it in intelligible notation." To the Supreme Court in 1908, a piano roll, or for that matter a phonograph record, was not a copy (because it was not

humanly intelligible through the sense of sight) and therefore, in the Court's opinion, was not covered by the copyright statute.

Furthermore, the Court said, in keeping with its narrow construction of the word "copy", that issues of a new technology not specifically covered in the current statute "properly address themselves to the legislative and not to the judicial branch of the Government." However, it was clear from other Court statements that the Court was sympathetic to sound recording protection, despite its contrary ruling on the basis of its interpretation of the law as written.

At the time of the White-Smith ruling, Congress was working on the prospective Copyright Act of 1909, and one issue was whether copyright owners should have a new exclusive right to make recordings of their music. During hearings, Congress was told that one company had contracted with most of the major music publishers for exclusive licenses under the anticipated new law to record all the music controlled by those publishers for many years to come. The result was that Congress, in the 1909 Act, established a compulsory license for musical recording, requiring that once an owner of a musical copyright had permitted his work to be recorded by one company, any other company could record it similarly, upon payment of 2 cents for each reproduction of the composition manufactured. This step prevented the anticipated recording monopoly.

However, this did not mean, necessarily, that recordings of musical compositions were copyrightable. They were not, strictly speaking, even though no one could lawfully manufacture records of copyrighted music without paying the compulsory license fee. Nevertheless, Congress provided for the copyright owner of a dramatic work to have exclusive rights in "any transcription or record thereof" in the 1909 Act, and extended this right this right to nondramatic literary works in 1952. The question whether, under the Constitutional clause on copyright, a recorded performance could be considered the "writing" of an "author" and therefore eligible for copyright protection if Congress so chose to grant it, was apparently disposed of in the affirmative in the case of Capitol Records, Inc. v. Mercury Records Corp., heard by the 2nd Circuit Court in 1955. However, it was not until 1971 that Congress passed a law naming "sound recordings" as a category of copyrightable works, when it became evident that "record piracy" had become rampant and was growing. In the 1976 General Revision, Congress provided for copyright of works "fixed in any tangible medium of expression" and defined "sound recordings" as "works that result from the fixation of a series of musical, spoken, or other sounds, but not including the sounds accompanying a motion picture or other audiovisual work, regardless of the nature of the material objects such as disks, tapes, or other phonorecords in which they are embodied" (Section 101). Thus motion picture sound tracks are not covered as "sound recordings," although they are covered elsewhere. This is due to their judicial history and their closer connection with motion pictures as an industry.

3.2.1 Copyrighted Music in Sound Tracks

In 1946, the question arose whether a producer of motion pictures was entitled to a compulsory license for 2 cents per recording for use of a performance of copyrighted music in a sound track of a motion picture. Clearly, in 1909, when the compulsory license for music recordings became law, sound tracks in motion pictures were unknown. Consequently, this was a clear case for judicial interpretation. That the Court decided in the negative on purely economic grounds may be noted from the following quotes from the Court decision on this case, Jerome v. Twentieth Century - Fox Film Corp:

> "Counsel assert that no more than 500 positive prints of a film of a musical motion picture are made to supply the demands for exhibition purposes. If Section 1(e) [the compulsory license provision of the 1909 Copyright Act] applied to a motion picture use of a musical composition, then and producer could appropriate a copyrighted musical composition for use in a motion picture for a total sum of about $10.00, at the rate of 2¢ for each positive print... The result would be destructive of valuable rights of composers and publishers, which the Act was intended to secure and protect."

In the 1976 Act, the view that the compulsory license provision did not apply to sound tracks was stated explicitly. Owners of copyrights in music retained the exclusive rights to record on sound tracks and the compulsory license to record was confined to the making of "phonorecords" which excludes sound tracks as a subset.

3.2.2 Educational and Library Reproduction of Phonorecords

In the 1976 General Revision of Copyright Law, sections 107 and 108 and related pages of House Reports 94-1476 and 94-1733 concern the concepts of fair use and permitted educational and library reproduction of works. The content of this material is discussed in Section 3.6.2 below in the context of photocopying because the problems addressed by that material arose primarily from that cause. However, a review of the documents shows that the solutions applied to photocopies also apply, in general, to phonorecords.

3.3 COPYRIGHT IN MOTION PICTURES

With this technology, as with others, the Federal Courts struggled with the question of whether new technology not specifically provided for by Congress is protected by virtue of extension of concept or is not protected by virtue of strict literal interpretation.

The problem arose in 1903 in the question whether a sequence of photographs telling a story could be protected with the affixation of a single copyright notice or whether each photograph had to have its own notice, as literally intended when Congress protected (individual)

photographs in 1870. This was the situation in Edison v. Lubin. In that case, the District Court said:

> "...if...the law is defective, it should be altered by Congress, not strained by the courts."

On the other hand, the Circuit Court of Appeals, in reversing the District Court, said:

> "When Congress...saw fit...to extend copyright protection to a photograph...it is not to be presumed it thought such art could not progress, and that no protection was to be afforded such progress. It must be recognized there would be change and advance..."

In 1912, Congress amended the copyright statutes to include "motion-picture photoplays" and "motion pictures other than photoplays" as protected classes of works. The 1909 revision had made no mention of these concepts, although they were well-known at the time. After 1912, then, there was protection for motion pictures against unauthorized copying, but due to the specific language of the statute, it was clear that there was protection against unauthorized "public performances" (as distinguished from copying) only for dramatic and musical works. The question whether a motion picture photoplay was a dramatic work arose therefore through litigation.

Specifically, this question arose in Tiffany Productions v. Dewing, (1931), and in M. G. M. v. Bijou Theatre, (1933). The effect of both cases was to insure that a motion picture photoplay was legally defined as a type of dramatic work and that the protection of copyright was accorded to public performances or exhibitions of this type of motion picture.

In the Tiffany Productions case, the Court (holding that a motion picture photoplay was a form of a dramatic work) said that:

> "The statute must be given a sensible meaning in its application to modern invention, expressly within the scope of the statute."

In the M. G. M. case, the District Court, in a decision later countermanded, had said:

> "...the effect of a new invention in any given field seems to be a matter for legislative consideration, rather than for the extension of existing statutes by judicial construction."

3.3.1 Sound Tracks in Motion Pictures

"Talking motion pictures began to be produced about 1924, some 12 years after motion pictures were added to the copyright statutes as a protected class of work. Despite the lack of explicit copyright protection,

the industry groups concerned tacitly accepted and operated on the premise that the sound track is protected as an integral part of the motion picture; and this premise appeared then and continues to appear to be logically valid since the pictures and sound together are necessary to constitute the complete work and to convey its artistic effect. This concept was given some judicial validity in the case of L. C. Page & Co. v. Fox Film Corp., (1936); in which the Court stated that "as the plaintiff well says, 'talkies' are but a species of the genus motion pictures."

In 1971, in the House Report on the amendment to the copyright statute which extended protection to sound recordings excepting those sounds accompanying a motion picture, a statement on sound tracks was made. The House Report stated:

> "The exclusion [of sound tracks from the protection accorded sound recordings] reflects the...opinion that sound tracks or audio tracks are an integral part of the "motion pictures" already accorded protection...and that the reproduction of the sound accompanying a motion picture is an infringement of copyright in the motion picture."

Finally in the 1976 General Revision, it was clearly stated that the definition of motion picture included accompanying sounds, and that the copyright in a motion picture included the right to perform it publicly by making its images visible or its sounds audible.

Thus, from 1924 until 1976, more by general unstated agreement than by actual law or judicial interpretation, sound tracks were accepted as an integral part of motion pictures.

3.4 RADIO AND TELEVISION BROADCASTING

In 1909, radio and television broadcasting were unknown and a public performance was thought of as a performance given in the presence of a group of persons assembled within sight or hearing of the performers. When the use of the copyrighted music and plays in radio broadcasts became common in the early 1920's, the question arose whether broadcasts of copyrighted works were public performances within the scope of the 1909 Statute.

This question was considered in the case of Jerome H. Remick & Co. v. American Automobile Accessories Co. in 1925 with respect to a radio broadcast of a musical work. The court held that the broadcast did constitute a public performance, stating:

> "While the fact that the radio was not developed at the time the Copyright Act...was enacted may raise some question as to whether it comes within the purview of the statute, it is not by that fact alone excluded....The statute may be applied to new situations not anticipated by Congress, if, fairly construed, such situations come within its intent and meaning....

> While statutes should not be stretched to apply to new situations not fairly within their scope, they should not be so narrowly construed as to permit their evasion because of changing habits due to new inventions and discoveries....The artist [in a radio broadcast] is consciously addressing a great, though unseen and widely scattered audience, and is therefore participating in a public performance."

The ruling in this case was generally accepted in practice by broadcasters and other concerned parties. In addition, the ruling in this case determined that the public performance was "for profit" if the broadcast was over a commercial station that was used as a medium for advertising, regardless of the fact that the broadcast listeners did not pay an admission fee.

A similar result ensued in the case of Leo Feist, Inc. v. Lew Tendler Tavern in 1958, which extended the public performance concept from broadcasting to wire transmissions. In this case, music transmitted over wire from a central location to a restaurant and then made audible there for the benefit of restaurant patrons was found to be a public performance for profit.

The 1976 Act codified these results by assigning the copyright owner the exclusive right (with certain exemptions) of public performance and display; and by including in the definition of public performance and display transmission or communication to the public "by means of any device or process, whether the members of the public capable of receiving the performance or display receive it in the same place or in separate places and at the same time or at different times" (Section 101).

3.4.1 Retransmissions of Broadcasts

A question that was to have very important ramifications 35 years later for cable television retransmissions was raised in the case of Buck v. Jewell-La Salle Realty Co. in 1931 before the U.S. Supreme Court. In that case, a hotel maintained a master radio set which was wired to loud speakers from which the radio programs could be heard in all of the public and private rooms of the hotel. The Court held that the hotel's reproduction of the broadcast performance, through its receiving set and loudspeakers, for the entertainment of its guests, was itself a public performance under the 1909 Statute and therefore not exempt from the implications of the Statute for royalty payment. The opinion in this case by Justice Brandeis for the Court is quoted from extensively in Section A.2.4.2 of Appendix A of this report and is a prime example of reasoning by analogy in determining the law with respect to new technological devices not previously considered by Congress.

Another similar case which confirmed the copyright owners' rights to retransmissions in a hotel situation was SESAC v. New York Hotel Statler Co. decided in 1937.

3.5 COPYRIGHT IN CABLE TELEVISION RETRANSMISSIONS

By the middle of the 1960s, commercial enterprises had sprung up whose functions were to provide TV viewers with programs that the viewers were unable to receive satisfactorily with standard antennae. This industry, because it serviced subscribers via cable, a non-broadcast mode, became known as CATV, community antenna television, or cable television. The industry obtained much of its program material from broadcasted TV which it acquired with more sensitive receiving equipment and more sophisticated or better situated antennae than its subscribers were capable of providing for themselves individually.

In the opinion of copyright owners, significant copyright problems existed. The primary over-the-air boradcasters obtained licenses from copyright owners for the motion pictures, plays, music, and other works that they broadcast. Was the retransmission of the broadcasted programs by the cable system to its subscribers to be treated as a further public performance of the copyrighted works which infringed the copyright owners exclusive rights?

This question came before the courts in 1966 through 1968 in the case of United Artists Television, Inc. v. Fortnightly Corp. The District and Circuit Courts held for the copyright owners, relying on the previous decisions described above, i.e. Remick, Jewell-LaSalle, and SESAC, that the retransmission, as a public performance for profit, was covered by the Copyright Act then in force. It is not surprising, in light of previous decisions quoted, that the District Court in this case spoke about "accomodating the statute to the realities of modern science and technology."

However, to the surprise of many, the Supreme Court reversed the lower court findings by essentially determining that cable television program providers were acting as viewers' agents rather than as secondary producers. The Court reasoned that:

> "...while both broadcasters and viewers play crucial roles in the total television process, a line is drawn between them. One is treated as active performer; the other as passive beneficiary.
>
> "When CATV is considered in this framework, we conclude that it falls on the viewer's side of the line...."

The Court carried forward this precedent-breaking decision and similarly found no infringement in the 1974 case of CBS v. Teleprompter. The issue in the latter case was a possible distinction between the retransmission over cable of local signals that could have been received over the air by cable subscribers and the retransmission of far distant signals not originally intended for the cabled locale. The Supreme Court found no distinction and determined that there was no infringement in either case.

The more complete discussion of Section A.2.6 of Appendix A provides some rationales for these Supreme Court decisions. As noted there, a major element in the decisionmaking appeared to be a desire to prevent the CATV industry from being retroactively liable for royalties and infringement damages. The majority opinion in the Fortnightly decision had said in a footnote, that a decision consistent with Jewell-La Salle would be such "as retroactively to impose copyright liability where it has never been acknowledged to exist before." Here the Court is implying that a judicial decision for the copyright owners (unlike a legislated decision) could not cause royalties to flow from that time on, but would be forced to require that the CATV industry be responsible for all past royalties it should have paid. These back royalties might be large enough to destroy many of these small operations.

The fact that Congress was considering major revisions to the Copyright Act during the times of the Fortnightly and Teleprompter litigations cannot be ignored as a factor in the Supreme Court's decisionmaking. As noted in Section A.2.6, both the majority and dissenting opinions in Fortnightly, as well as in the lower court decisions, in both Fortnightly and Teleprompter, took cognizance of the on-going considerations by Congress of the copyright problem of cable retransmissions in the context of the general revision of copyright law. Justice Fortas, in his dissent in Fortnightly had commented:

> "Our major object, I suggest, should be to do as little damage as possible to traditional copyright principles and to business relationships, until the Congress legislates and relieves the embarrassment which we and the interested parties face."

Similarly, the Circuit Court of Appeals noted in Teleprompter:

> "The complex problems represented by the issues in this case are not readily amenable to judicial resolution....We hope that the Congress will in due course legislate a fuller and more flexible accomodation of competing copyright, anti-trust, and communications policy considerations, consistent with the challenge of modern CATV technology."

Thus the judiciary in general, saw the issues as more complex than a simple extension of principle as embodied in Buck v. Jewell-La Salle. The interaction of basic communications policy in the public interest and the economic interests of the concerned parties demanded a legislative solution. Ultimately, the approximately ten years of negotiation among the various concerned parties resulted in the provisions of Section 111 of the 1976 General Revision of Copyright Law.

This 1976 General Revision makes cable retransmissions subject to the restrictions of copyright, thereby validating at least the principle of the dissent in Teleprompter which was based on the precedent of Buck v. Jewell-La Salle. However, a cable company now may obtain a compulsory license for retransmission of programs from those stations whose

signals the system is authorized to carry by the Federal Communications Commission, and it is not liable for any royalties before the effective date of the new Act.

3.6 COPYRIGHT IN PHOTOCOPIES

The issue of photocopying as a serious concern to copyright proprietors of printed matter dates from the 1930s. During that period, microphotography came to be extensively used, because it was a process that enabled printed matter to be reproduced at a reasonable cost.

In the 1930s, discussions took place between the predecessor to the Association of American Publishers and organizations of scholarly users such as the American Council of Learned Societies and the Social Science Research Council in order to define the boundaries of acceptable non-infringing photocopying. These discussions resulted in the "Gentlemen's Agreement" of 1935 which, although not binding, provided guidelines that were followed by many libraries and which stood as a basis governing library photocopying for a generation.

The significant paragraphs of the Gentlemen's Agreement are as follows:

> "A library, archives, office, museum, or similar institution owning books or periodical volumes in which copyright still subsists may make and deliver a single photographic reproduction or reduction of a part thereof to a scholar representing in writing that he desires such reproduction in lieu of loan of such publication or in place of manual transcription and solely for the purpose of research; provided
>
> (1) that the person receiving it is given due notice in writing that he is not exempt from liability to the copyright proprietor for any infringement of copyright by misuse of the reproduction constituting an infringement under the copyright law;
>
> (2) that such reproduction is made and furnished without profit to itself by the institution making it."

This was an important effort on the part of opposing interest groups to solve a national copyright problem among themselves without recourse to Government instrumentalities.

From the 1960s onward, the photocopying problem became progressively more acute as new photocopying technologies and improved mechanical paper-handling systems combined to reduce significantly the cost per copy and to increase significantly the speed of multi-copying. Publishers, especially of scientific and technical journals and of educational texts, expressed fears that loss of sales due to photocopying might force them to discontinue certain publications. However, the several opposing interests groups agreed that in the revision bills Congress considered

in the late 1960s, the doctrine of fair use would be incorporated rather than any specific rules for photocopying. The groups hoped to work out the details of an agreement among themselves using the fair use doctrine as a basis. This doctrine, as it had been developed by the courts, was contained in Section 107 of the copyright bill passed by the House of Representatives in 1966 but never enacted into law. Section 107 of the 1966 bill included the following:

> "...the fair use of a copyrighted work such as criticism, comment, news reporting, teaching, scholarship or research, is not an infringement of copyright. In determining whether the use made of a work in any particular case is a fair use, the factors to be considered shall include--
>
> (1) the purpose and character of the use;
> (2) the nature of the copyrighted work;
> (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
> (4) the effect of the use upon the potential market for or value of the copyrighted work."

However, final agreement between librarians and publishers was not able to be worked out at that time. It foundered on the essential question of the specific boundary between fair use and infringement, and the quantity and purposes of copying which crossed the boundary.

3.6.1 Williams & Wilkins v. United States

In 1971, a suit was instituted in the U.S. Court of Claims in which the plaintiff, a publisher of medical journals and books, charged that two Government libraries, The National Institutes of Health library and the National Library of Medicine, had infringed the copyright in several of its medical journals. The plaintiff claimed that the copying done by those institutions in supplying journal articles to other medical libraries, research institutes, individual researchers, and practitioners exceeded fair use.

This case was Williams & Wilkins Co. v. United States. The initial opinion of the Commissioner hearing the case (1972) held that photocopying practices of the two Government libraries exceeded fair use. The full Court (1973) reversed this decision, 4 to 3, basing its majority opinion on essentially three criteria:

> "First, plaintiff has not in our view shown, and there is inadequate reason to believe that it is being or will be harmed substantially by these specific practices of NIH and NLM;
>
> "second, we are convinced that medicine and medical research will be injured by holding these particular practices to be an infringement; and
>
> "third, since the problem of accomodating the interests of

science with those of the publishers (and authors) calls fundamentally for legislative solution or guidance, which has not yet been given, we should not, during the period before congressional action is forthcoming, place such a risk of harm upon science and medicine."[18]

The three dissenting judges of the Court of Claims noted, in opposition:

> "What we have before us is a case of wholesale copying, and distribution of copyrighted material by defendant's libraries on a scale so vast that it dwarfs the output of many small publishing companies...This is the very essence of wholesale copying and, without more, defeats the defense of fair use."

Thus, the two sides differed materially on the interpretation of the facts. The situation is reminiscent of the cable TV cases, Fortnightly and Teleprompter, where Court majorities were of the opinion that the situation demanded a legislative answer that was more flexible, involving components of right from both sides, rather than the limited yes-no answer of a judicial decision. As in those cases, the Court refrains here from providing the decision that would tend more to permanently end the controversy and would tend to end it with a greater detriment to one side than the Court feels that the losing side deserves. This interpretation may be supported with this quote from the majority opinion in Williams & Wilkins:

> "The Courts are now precluded, both by the Act and by the nature of the judicial process, from contriving pragmatic or compromise solutions which would reflect the legislature's choice of policy and its mediation among the competing interests...Hopefully, the result in the present case will be but a 'holding operation' in the interim period before Congress enacts its preferred solutions."

The Williams & Wilkins case was accepted for review by the Supreme Court, where, after the arguments were heard, the Court split 4 to 4 without an exposition of the reasoning on the two sides. This had the effect of affirming the decision of the full Court of Claims.

3.6.2 The 1976 General Revision

Certain provisions included in the 1976 General Revision of Copyright Law were the result of hard bargaining among authors, publishers, educators, and librarians. Section 107 of the 1976 Act contains the fair use concept essentially as reproduced above (in Section 3.6) except for the addition of two phrases as concessions to educators. A purpose of use for which fair use is allowable is now teaching "(including multiple copies for classroom use)." In addition, a factor to be considered in determining whether a particular use is a fair use is "whether such use is of a commercial nature or is for nonprofit educational purposes." The House of Representatives report on the proposed 1976 Act (Report No.

94-1476 at pages 67-71) includes the texts of agreements between educators on one side and authors and publishers on the other establishing standards of fair use for educational purposes. These agreements were reached at the urging of the Congressional committees, after a series of meetings between the opposing parties.

The problem of library photocopying for scholars and researchers is dealt with in Section 108 of the 1976 Act. The language of Section 108 makes it clear that library rights do not extend to "the related or concerted reproductions...of multiple copies...of the same material," or "the systematic reproduction...of single or multiple copies." In addition, the Conference Report on the proposed 1976 General Revision (House Report No. 94-1733 at pages 71-73) contains a set of guidelines agreed to by the opposing parties that define the extent of loans permitted in interlibrary arrangements. These guidelines were developed with the assistance of the National Commission on New Technological Uses of Copyrighted Works (see Section 3.8, below).

3.6.3 Current Situation

Despite the successful negotiations that resulted in the provisions of the 1976 General Revision, the photocopying problem is not fully solved. There does not exist at this time any fully-established clearinghouse or other mechanism for payment of royalties for photocopying beyond the guidelines established, nor is it clear that the current guidelines can be enforced. At present, an effort is underway through the auspices of the Association of American Publishers to establish a clearinghouse system.[19]

3.7 COPYRIGHT IN MICROMEDIA AND VIDEOTAPE

The decision to accept for copyright registration a work on a micromedium that would otherwise be copyrightable if intelligible to the unaided eye was made independently by the Copyright Office through its regulations. It was believed by that office that the 1908 Supreme Court decision in the White-Smith case, which had never been overturned, would not prevent the registration of a work on micromedia since that Court ruling concerned a piano roll which was not intended to be made visually intelligible in its normal use. Since a work on any type of micromedia was intended to be made visually intelligible (with the aid of devices) when communicating information to people, the Copyright Office did not believe that the White-Smith ruling took precedence. The same reasoning was applied in the later acceptance for copyright of works on videotape.

These regulations of the Copyright Office were generally accepted and not challenged in the Courts. The 1976 General Revision of Copyright Law removed any lingering doubts about these regulations by making copyrightability independent of the medium in which a work is fixed.

3.8 THE ESTABLISHMENT OF CONTU

Significant recognition of the need for the National Commission on New

Technological Uses of Copyrighted Works (CONTU) dates from 1967. It became clear at that time that the lack of adequate study of the problem of the impact of computers and information storage and retrieval systems on copyright would conflict with efforts to enact a general revision of copyright law.

The question of how the law would view computer uses of copyrightable works during the time that CONTU was deliberating and before Congress acted on CONTU's recommendations prevented quick agreement on the formation of CONTU and delayed its establishment. Ultimately, agreement was achieved among opposing interest groups on inserting a section in the proposed general revision of copyright law that provided that the law on the use of copyrighted works in computer systems was to be unaffected by enactment of the general revision. This paved the way for establishment of CONTU on Dec. 31, 1974 as P.L. 93-573.[20]

In addition, the "hold constant" section, Section 117, was enacted as a part of the 1976 General Revision of Copyright Law, P.L 94-553 on Oct. 19, 1976. The new Act takes effect on January 1, 1978. Section 117 states that:

> "...this title does not afford to the owner of copyright in a work any greater or lesser rights with respect to the use of the work in conjunction with automatic systems capable of storing, processing, retrieving, or transferring information... than those afforded to works under the law...in effect on December 31, 1977..."

The function of CONTU (according to P.L. 93-573, Section 201) is to study and make recommendations to Congress on legislation or procedures concerning:

> "(1) the reproduction and use of copyrighted works of authorship--
> (A) in conjunction with automatic systems capable of storing, processing, retrieving, and transferring information, and
> (B) by various forms of machine reproduction, not including reproduction by or at the request or instructors for use in face-to-face teaching activities; and
> (2) the creation of new works by the application or intervention of such automatic systems of machine reproduction."

It may be noted also that CONTU is to be concerned with:

> "Changes in copyright law or procedures that may be necessary to assure...access to copyrighted works, and to provide recognition of the rights of copyright owners" (Section 201 (c)).

In the above, the balancing of the needs of users and producers may be

seen. Similarly, the balancing of several interest groups may be noted in the establishment of the requirements for memberships on the Commission (Section 202 (a)):

> "The Commission shall be composed of thirteen voting members, appointed as follows:
>
> (1) Four members, to be appointed by the President, selected from authors and other copyright owners;
> (2) Four members, to be appointed by the President, selected from users of copyright works;
> (3) Four nongovernmental members to be appointed by the President, selected from the public generally, with at least one member selected from among experts in consumer protection affairs;
> (4) The Librarian of Congress."

CONTU must present its final report to Congress by July, 1978, if the extension of time it has requested is enacted by Congress. Otherwise its final report is due in December, 1977.

3.9 SUMMARY

This chapter has examined policymaking about copyright through a review of some important litigations and some aspects of enacted law and regulation which have concerned the impact of technological change. The review appears to show that some significant litigations in this field have concerned the boundaries of property rights left ambiguous because of the occurrence of technological change unforseen by Congress in previous revisions of law or the occurrence of specific situations not definable in legislation.

In general, the Federal Courts have approached the question of ambiguities due to technological change from two distinct points of view. The first viewpoint is that, if the general concept of current law can be easily extended to new situations without stretching the law's meaning too far, it should be done. The second viewpoint is that stretching the law's meaning (or specifically defining the ambiguous) beyond a certain point would be to take on a responsibility better left to Congress, particularly if a judicial decision would be precedent setting, involving relations between interest groups, not just the particular litigants.

The first viewpoint may be seen in the final decisions of the cases described involving broadcasting, motion pictures, and sound recordings except for White-Smith. The second viewpoint was taken in the prevailing decisions in White-Smith, the cable TV cases Fortnightly and Teleprompter, and in Williams & Wilkins.

Significantly, during all the cases above involving the second viewpoint, Congress was in the process of actively revising the copyright statute. Such statutory revision often involves representation of many opposing

interest groups and the ultimate statutory language may involve interest group compromise setting forth obligations and responsibilities and establishing new institutions in a manner completely impossible to accomplish through a judicial decision. In fact, in the 1976 General Revision, the new statutory language and associated legislative documentations involving cable TV and educational and library copying are examples of such a complex balancing of interests.

Furthermore, in the more recent situation described above, a new balancing of interests may be seen which is not apparent in the earlier cases. If persons concerned with copyrighted works may be considered either producers or users, the earlier cases described are all essentially conflicts between original producers and secondary producers. (The enactment of the compulsory license for phonorecord manufacturing in 1909 could be viewed as expression of user concern, however).

In the Fortnightly decision (1968), the view was taken that the cable TV company was the viewer's (i.e. user's) agent. In photocopying, the conflict between authors and publishers on one side and librarians and educators on the other is essentially a user-producer conflict (although some educators are also producers). This increasing concern with the user in the copyright field has been carried forward in the establishment of CONTU where both representatives of users and producers and "at least one member selected from among experts in consumer protection affairs" are included in the membership of the Commission by statutory requirement.

Finally, it seems clear from the above that, in this field, administrative regulation plays a relatively small role in contrast with some other Federal domestic responsibilities. Nevertheless, the Copyright Office has played a role in technological change by agreeing to accept for copyright registration, works in micromedia and videotape by its interpretation of existing law rather than through explicit congressional action or judicial orders. However, see Section 5.5.1 and 5.5.2 for an important policy-impacting function of the Register of Copyrights.

4. TOWARDS AN EFFICIENT MARKETPLACE FOR COPYRIGHTED WORKS

The previous chapter considered the legal framework for copyright. This chapter is concerned with economic questions relevant to the market for copyrighted works. Clearly, an effective legal structure and an efficient marketplace for copyrighted works are both necessary and mutually supportive.

In this chapter, the fundamental question of transaction costs is considered. The question of exclusion and enforcement is discussed in light of the ease of modern technology to permit easily available and low-cost duplication of works. Mechanisms for the minimization of transaction costs are described including types of efficient pricing schedules. In addition, fair use is considered from an economic viewpoint. Lastly, the question of monopoly is discussed and government remedies are described.

4.1 THE PROBLEM OF TRANSACTION COSTS

The view of Professor Kenneth Arrow is that transaction costs are more fundamental than market failure as a basic problem pertinent to the choice of whether a particular good should be provided through the market mechanism or through some form of collective action. He states that:

> "...transaction costs....are attached to any market and indeed to any mode of resource allocation. Market failure is the particular case where transaction costs are so high that the existence of a market is no longer worthwhile."[21]

Two major sources of transaction costs, according to Arrow, are:

> "(1) exclusion costs [and] (2) costs of communication and information, including both the supplying and the learning of the terms on which transactions are carried out."[22]

Steiner sees transaction costs specifically involved when there is an

> "inability of the market to translate potential willingness to pay into revenues [and] where the private market is technically able to collect revenues, but at a high cost."[23]

Hurt and Schuchman are, to a large extent, considering transaction costs when they ask:

> "If there is a benefit from the copyright system, is it offset, at least in part, by various administrative costs and frictions inherent in the system?"[24]

Specifically, transaction costs play a large role in copyright problems, and overcoming high transaction costs plays a large role in the solution of copyright problems.

4.2 THE QUESTION OF ENFORCEMENT

There are situations involving copyright that concern the fundamental issue of what Arrow referred to as "exclusion." At the present time, some of these situations are occurring because of the availability of the technologies of high-speed photocopying and of copying digitized information by computer.

Persons with easy access to machines employing these technologies can become low-cost publishers, legalities aside. Thus, these persons are not easily "excluded" from ownership of copies upon their failure to pay a royalty. The question of enforcement then arises, and the cost of enforcement must become an issue. Concern with efficient allocation of resources as well as the deleterious effects of easy evasion of law must prompt the question of whether there is any value in issuing copyrights that cannot be enforced with any reasonable allocation of effort.

Hurt and Schuchman have theorized about strategies an original book publisher might employ in the absence of any copyright at all.[25] According to one scenario, the original publisher must produce enough books in his first edition to saturate the market. If a copying publisher enters the market (probably with a similar number of copies), the first publisher must be prepared to compete by lowering his prices. Many unsold books can be expected in this situation. A second strategy is for the first publisher to be prepared with an extremely low-cost edition as a retaliatory measure.

Similarly, in a 1970 article in the Harvard Law Review opposing copyright protection for computer programs at that time, Professor Stephen Breyer proposed a strategy that could be employed by program developers in the absence of such protection.[26]

> "One may wonder, for example, whether, without protection, smaller hardware or software firms would not find it easier to use parts of IBM programs in their efforts to compete with IBM,"

Professor Breyer wrote.[27]

Although Professor Breyer did not extend his scenario, it is possible to theorize about protective behaviors available to the originators of computer programs to protect themselves in such a hypothetical situation. One such strategy could be for an originator to produce programs for sale in object code only, with minimum documentation, thereby making it very difficult for a potential copier to know exactly what he had in hand. In fact a proposal for "sealed-in software" that might be protectable by either trade secret or copyright has been made recently by Calvin Mooers.[28]

4.2.1 Transaction Costs Even If No Copyright

A conclusion that can be drawn from both these examples is that there

are transaction costs regardless of whether the imperfect protection of law exists or does not exist. To repeat from Arrow, "transaction costs ....are attached to any market and indeed to any mode of resource allocation." In the Hurt and Schuchman example, among the transaction costs that might be expected are the extra books left over, the poor quality of merchandise required to prevent financial losses, the extra secrecy required to prevent future plans and the first copies from being prematurely revealed, and the extra efforts that would be needed in merchandizing strategems to thwart a competitor's sales outlet possibilities. In the Breyer example, assuming the protective strategy of object code dissemination only with minimal documentation, among the transaction costs to be expected are the reduction in information dissemination about program content to everyone including disinterested observers who might benefit in another context, the reduction in ability to recognize mistakes in programs and to correct them, and the lowering of incentives to produce new programs that are genuinely novel or original.

Thus, in both examples which assume no Government copyright protection, we have postulated that cut-throat competition, losses in information flow and increases in secrecy would result. In a society in which the market protection of copyright is available, Government regulation has its cost and some infringement from imperfect exclusion can be expected to result, but we suggest that in addition, a more open society with greater opportunities for creativity exists. Thus, the choice is not just between the size of transaction costs inherent in the alternatives, but in the kinds of costs and their effects which a society is willing to tolerate.

4.2.2 The Optimal Level of Enforcement and Its Consequences

Hopefully, a society will select that set of resource allocation mechanisms that maximizes its satisfactions. However, a difficult state of affairs for a society to accept is that it cannot achieve the complete maximization of its satisfactions with any set of mechanisms because of the limited resources it can apply. A reasonable strategy is to achieve an optimum level of satisfaction from resources available, permitting a certain amount of dissatisfaction to remain. Professor Edwin Mansfield has demonstrated that there is an optimum level of crime whose cost ought to be tolerated, based on the finite resources of enforcement which a society is willing to allocate.[29] This concept can be easily adapted to copyright infringement.

As shown in Fig. 1, the probability of apprehension and conviction of infringers increases with increasing expenditure of resources devoted to enforcement; but the costs to society of infringements increase as fewer resources are devoted to enforcement and the probability of conviction goes down. A minimum total cost results from the sum of infringement and enforcement costs, at a particular probability less than 1.0 of apprehension and conviction. This leaves some infringers unapprehended or unconvicted.

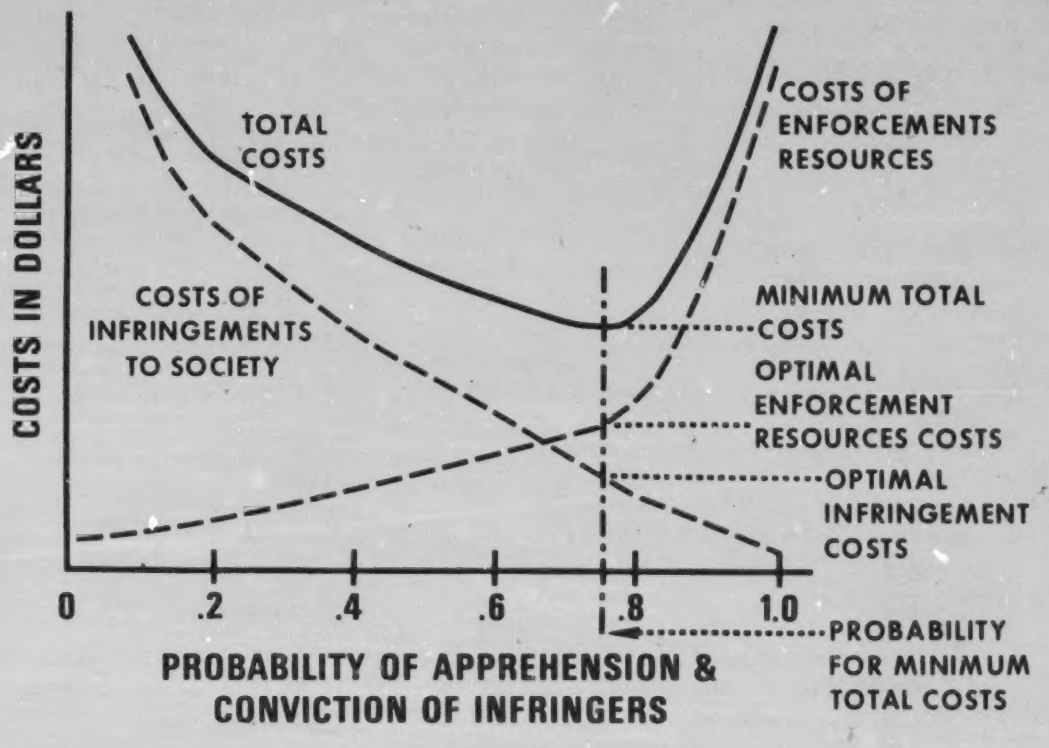

Figure 1. The "Optimal" Level of Copyright Enforcement

If a society is unhappy with this level of infringement, it can raise the resources allocated to enforcement. However, it might take unrealistically large resources to guarantee conviction of all infringers. On the other hand, abolishment of enforcement on the grounds of its ineffectiveness and the consequent large increase in what was formerly called crime might create new, unanticipated kinds of dissatisfactions which society is unprepared to accept.

4.3 THE DESIGN OF ROYALTY COLLECTION SYSTEMS

Under the assumption that the benefits to a society of providing copyright protection and enforcement outweigh the costs, a question that arises is how the market for intellectual property should be structured to minimize transaction costs and to promote efficient pricing. The transaction costs considered here are Arrow's "costs of communication and information." A situation requiring special consideration for reduction of transaction costs is that which exists when there are a large number of users and a large number of producers. In this case, one of a number of different licensing schemes may be most effective.

4.3.1 A Comparison of Types of Licenses

Clearinghouse licensing and direct licensing are examples of licensing types that may be employed. With either of these situations, there is the possibility of a blanket license or a per-use license.

A clearinghouse is simply a multi-producer organization established for royalty collection. The advantage of a clearinghouse over direct licensing is that the user has a single point of negotiation, a single place to send royalty payments; and there is likely to be a reduction in the number of payments having to be made. The producer similarly has a reduction in transaction costs because he obtains his royalties from one place and with one payment. On the other hand, with a clearinghouse, there may be a blurring of individual producer considerations. The necessity of simple, all-encompassing contractual provisions may cause some producers with special situations to obtain less (or more) royalties than they would have if they negotiated individually. For each producer, the gain from the economy of scale of the clearinghouse would need to be traded-off against this loss of individuality.

Similar problems must be considered in the selection of the per-use or blanket license. With a per-use license, the major cost is collecting the information. This may be technologically dependent. For example, with uses that are associated with a computer, the capability of collecting use-related data may be high, particularly if it is the producer's computer that is being used and if "use," as opposed to memory-residence, is easily defined. On the other hand, for mechanical photocopying, the collection of use-related data may be difficult, particularly data which might distinguish the various works being copied.

With blanket licensing (a single yearly fee for all use), the amount

of data needed to be collected is reduced. If the blanket license is in reality a substitute for a per-use license, simply because the cost of collecting per-use data is too high, then the reduction in data collection costs must be traded-off against the increase in inaccuracy and inequity in royalty collections and royalty distributions. Some reduction in inaccuracy may result from dividing users into classes dependent on expected use; and by sampling uses.

Appendix B presents some data from the British Lending Library (simply as an illustrative example) demonstrating that photocopying there is heavily skewed in terms of the frequency of photocopying from various journal titles. A survey indicates that of approximately 15,000 serial titles held by the British Lending Library, the top 200 titles accounted for 20% of the photocopying demand and the 6000 least-requested titles accounted for the last 10% of the demand. U.S. data will likely show a similar skewness.

As noted in Appendix B, this skewness can lead either to lower or higher payments to individual copyright proprietors, depending on the payment algorithm employed. In addition, for those journal titles little used, a larger amount of sampling conceivably coupled with more sophisticated sampling methods might be needed to accurately determine the true extent of photocopying.

At a time a new licensing scheme is to be established, producers may find it important to consider these various trade-offs so that the mechanism with the lowest transaction costs can be adopted. From the user's viewpoint, transaction costs include the value of time and effort as well as the dollar amount of royalties. That mechanism that is easiest to use, i.e. least costly in time and effort, all other things being equal, will probably generate the least amount of deliberate evasions and therefore the lowest enforcement costs as well.

4.3.2 Examples of Existing Clearinghouses

The Harry Fox Office is the mechanism through which many of the music publishers have issued licenses for the recording of individual compositions on phonorecords. (See Appendix A, Section A.4.6.3). Despite the availability, since the passage of the 1909 Act, of a compulsory license with the Copyright Office serving as a repository of ownership information[30], licensees may find that better terms are available from the Harry Fox Office in return for greater assurance of precise information about numbers of records manufactured and delivered. Royalties owed are computed from this information.

Three clearinghouses now exist for the collecting royalty payments for public performances of musical works. These are the American Society of Composers, Authors and Publishers, Inc. (ASCAP), Broadcast Music, Inc. (BMI) and SESAC, Inc. The combined membership of ASCAP, BMI and SESAC comprise the copyright owners of virtually all music copyrighted in the United States. Licensees are required to pay only a lump-sum royalty

annually in a predetermined amount (a blanket license). However, many broadcasters maintain logs as a matter of standard practice, and these are made available to the clearinghouses if required. These logs, plus a limited amount of sampling of performances, provide sufficient information for proportioned distribution among the individual copyright owners of the fees collected. The distribution is made approximately according to the estimated number of performances of each work. The cost of operating ASCAP is said to run about 19% to 20% of its gross revenues.

4.4 ROYALTY PRICING SCHEMES

This section considers pricing rules that can be employed to differentiate different classes of users and to cover different types of costs. It is assumed that all users in a particular class are treated identically, and that the purpose of the pricing rules is not for anti-competitive reasons, but to efficiently maximize income.

4.4.1 Individual and Institutional Users

A theory which justifies price differentials between individual and institutional users is described in Appendices C1 and C2 of this report. Here, an institutional user is one that serves to further distribute the work among individuals served by the institution. It is noted in Appendix C1 that, for a product distributed to classified users who do not move from class to class, an existing theory states that the prices among the classes should be inversely proportional to those classes' respective price elasticities, provided that marginal costs are the same for each class. However, in the provision of certain copyrightable works, e.g. scientific journals, users may obtain their copies either as the result of individual subscription or through use of an institutional copy. Thus, there are "cross-market" effects as users move between the classes. In this case, the work of Appendix C2 employs a variable called "the average number of potential subscribers" which measures the number of additional individual uses that would result from discontinued institutional use due to increased prices to the latter class. The value of this variable determines the price differential that should be offered. Tests that producers can make about the potential market can determine the value of this variable.

A second issue raised in these Appendices is whether the users of the institutionally-obtained work should pay per-use fees to the institution to defray the cost of the institutional subscription. In general, to the extent that the individual uses via the institutional subscription are private appropriations, these uses should be paid for by the users unless there are valid countermanding reasons. One such reason might be that it is in the public interest (or in the interest of the institution's owner) to encourage such individual use; and a second reason might be that the costs of collection are high relative to the revenue gained.

4.4.2 Services With High Fixed Costs

A pricing system often used for the provision of services that have a high fixed-cost element is the combination entry fee and per-use charge. Utilities often have connection charges as well as per-use charges. Some computerized, on-line, bibliographic or full-text search services are now using this type of pricing. Typically, there is a monthly or yearly use fee or entry charge, a time-on-line charge, and a "hit" charge for retrieval.

It is possible, also, to offer a user a choice between two charge plans. For example, a user might be offered either (a) a higher connect (entry) charge and a very low per-use charge or (b) a very low entry charge and a higher per-use charge. Depending on the break point, the high volume user will probably select (a), the plan with the low per-use charge, whereas the casual user probably will select (b), the plan with the low entry charge. The offering of two such plans may prevent either type of user, casual or high volume, from subsidizing the other type.

4.5 FAIR USE AS AN ECONOMIC CONCEPT

"Fair use" was originally a judicially-developed concept that can be conceived as a method of reducing certain kinds of transaction costs. It is now embodied in Section 107 of the 1976 General Revision of Copyright Law, as described in Section 3.6 above. The "fair use" concept historically recognized and attempted to allow for two basic principles that can be counterposed to the principle of copyright in a potential infringement situation. A third principle of "fair use" was added in the 1976 General Revision.

The first principle is that of the freedom of communication of ideas, derived from First Amendment considerations. (Professor Melville Nimmer has delineated the balance point in this potential conflict.[31]) Where First Amendment principles have dominance, there can be no exclusion. Thus, under "fair use", purposes of use such as "criticism, comment, news reporting, teaching..scholarship or research" are permitted, subject to limiting factors such as the amount of the work used. "Fair use" may be viewed as a method of reducing the cost inherent in a conflict between Article 1, Section 8 of the Constitution and the First Amendment.

The second principle allowed for under "fair use" is lack of marketplace impact. In the consideration of whether a particular use is a "fair use," a factor to be taken into account is "the effect of the use upon the potential market or value of the copyrighted work." Thus, it is recognized to be uneconomical and therefore inappropriate for resources to be expended in contractual efforts to obtain permission for usage of little or no market impact.

The third principle now added to "fair use" is indicated by the phrases in Section 107 of the 1976 General Revision relating to education.

These phrases, concerning allowable purposes of fair use, are "(.... multiple copies for classroom use)" and "for nonprofit educational purposes."

The exemption of royalty payments for worthy uses has been criticized by economists on principles of economic efficiency. The argument is that if a use is genuinely worthy, it is a public good whose cost ought to be spread over all the population and paid for through taxes. Otherwise, allowing an exemption for some uses and not for others has the effect of imposing the costs of worthy use exemptions on the "less-worthy users" as a specific class. This argument was similarly expressed by Professor Paul Goldstein in a criticism of the full Court of Claims decision in the Williams & Wilkins case[32]. In that case, the worthy use of medical research was given as a reason for rejecting the plaintiff's claim of infringement in a wholesale copying situation.

4.6 PRICE SETTING FOR COMPULSORY LICENSES

Compulsory licenses have been established in statute by Congress for certain categories of intellectual property; and in one case, a compulsory license is being enforced by Court order. In general, royalty prices in these situations have been (or will be) established by adversary proceedings involving producers and users and their supporters testifying before some institutional group empowered to set the figures.

4.6.1 The Phonorecord Manufacturing License, 1976 Act

An example of the procedure is the establishment of the compulsory license royalty fee for phonorecord manufacturing as a statutory matter in the 1976 General Revision. A summary of the testimony on this subject and the conclusion of the Senate Committee on the Judiciary is given on pages 91 through 94 of Senate Report No. 94-473.

Among the subjects of the testimony were (1) the need for an increase in the fee by copyright holders, (2) the potential impact of an increase on the record industry, and (3) the potential impact of an increase on the consuming public. Songwriters and publishers testified in favor of an increase over the 2¢ per each recording manufactured that was provided for in the 1909 Statute. They were supported by music consumers represented by the National Federation of Music Clubs who preferred a higher (royalty) ceiling "as a means of encouraging the writing of more and better music." The record companies testified in opposition to any increase in the 2¢ figure. They were supported by the Consumer Federation of America who wrote to the Committee agreeing that if the statutory fee were raised, record manufacturers would have to avoid risks on new and unusual compositions, reduce the number and length of selections, record fewer serious works and rely more on the public domain for popular material.

Some of the factors discussed in testimony included the royalty as a percent of list price per song; the royalty as a percent of manufacturer's

wholesale selling price; record company sales and profits; organization of the record industry; changes in income of copyright owners as a function of time, inflation rate, and royalty fee; and the effect of royalty fee on incentives for quality and quantity of products.

The Senate Committee concluded that the royalty fee per work embodied in each phonorecord manufactured and distributed should be 2 1/2 cents or one-half cent per minute of playing time, whichever is greater.

The House Committee on the Judiciary, on the basis of essentially the same testimony, concluded that the royalty fee per each work embodied in a phonorecord that is made and distributed should be "2 3/4 cents or 0.6 of one cent per minute of playing time or fraction thereof whichever amount is larger." (See House Report No. 94-1476 at pages 16 and 111).

The Conference Report (House Report No. 94-1733 at page 77) adopted the House fixed rate and the Senate per minute rate. This was ultimately enacted. Therefore the royalty is "either two and three-fourths cents or one-half of one cent per minute of playing time or fraction thereof, whichever is larger." (Section 115(c)(2), P.L. 94-553).

4.6.2 Jukebox Performance Royalty, 1976 Act

Under the 1909 statute, renditions of musical compositions through recordings in coin-operated machines (jukeboxes) were not classified as public performances for profit unless an admission fee to the location of the performance was also charged. Thus, most jukebox renditions were exempted from royalty payments. As both the Senate and House Reports on the 1976 Copyright Law Revision state, efforts to remove this exemption have persisted for 40 years. It is believed by some observers that in 1909, the extent of the jukebox industry could not be forecast and that this exemption was an historical accident. Testimony by copyright owners in congressional hearings on copyright revision strongly urged the imposition of a royalty fee on jukebox renditions of copyrighted works. Testimony by jukebox operators and manufacturers supported the retention of the present exemption. (See House Report No. 94-1476 at pages 111 to 115, and Senate Report No. 94-473 at pages 95 to 99.)

In the 1976 General Revision, Congress ended the exemption and imposed a yearly compulsory blanket license of $8 per jukebox (Section 116(b)(1), P.L. 94-553). In general the reasons given for ending the exemption were that the exemption was unfair to music producers; and also unfair to those other users who paid royalties and therefore were also paying the jukebox operators' share.

4.6.3 New Statutory Compulsory Licenses

The 1976 General Revision established two other compulsory licenses in addition to the jukebox performance license, all three of which joined

the previously-established phonorecord manufacturing license. The new licenses are for cable-assisted television (CATV) retransmission of broadcasted programs (Section 111(c) and 111(d), and for the use of certain copyrighted works in non-commercial broadcasting (Section 118).

As stated in Appendix A, Section A.4.6.3 "the purpose of the compulsory license in these three instances...is to avoid the difficulties that the user groups would encounter if they had to obtain licenses from and pay fees to the individual copyright holders." In other words, transaction costs are lessened under the compulsory license system.

4.6.4 The Copyright Royalty Tribunal

The 1976 Act establishes a Copyright Royalty Tribunal as an independent agency in the legislative branch (See Chapter 8 of the Act). The Tribunal's function is to periodically and equitably adjust the statutory blanket license fees for jukebox operation, to distribute equitably to copyright holders the statutory royalty proceeds collected from CATV operators, and to determine the terms and conditions of the compulsory license for non-commercial broadcasting of certain copyrighted works, but in the latter case, only if the interested parties fail to negotiate their own arrangements. The Tribunal determines, also, the royalty rates for CATV retransmissions under certain conditions.

4.7 COPYRIGHT AND MONOPOLY

It is common understanding that copyright is a monopoly, although limited to some degree. Walter Pforzheimer has quoted Judge Learned Hand on this point:

> "Copyright in any form, whether statutory or at common law, is a monopoly;...Congress has created the monopoly in exchange for a dedication, and when the monopoly expires the dedication must be complete."[33]

Similarly, the House Committee on Patents in their report accompanying the bill that became the 1909 Copyright Act stated:

> "The granting of such exclusive rights, under the proper terms and conditions, confers a benefit upon the public that outweighs the evils of the temporary monopoly."[34]

The appellation of "monopoly" can have several implications. A question that can be asked is: to what extent does the exclusive right granted to an author and his assignees constitute an exercisable economic monopoly in a market sense, thereby requiring Government regulation or other collective action as an antidote? The answer to this question may also provide an answer to an issue raised by Hurt and Schuchman which is: whether "copyright protection artificially enhances the private returns on [some] ventures and leads to the distortions of monopoly pricing."[35]

The answer depends, to some extent, on the nature of the copyrighted work

and whether other works can be considered substitutable and therefore competing.

If the copyrighted work is a book, musical performance or film produced for a general audience, there may very well be high substitutability among individual works as far as the ultimate consumer is concerned. In this situation, one author's exclusive right must compete with other exclusive rights in the marketplace to be selected or rejected by a typical consumer. However, since the competing works have a certain individuality about them, by the fact of their having the requisite originality for copyright protection, pure competition in a classical sense cannot exist. Nevertheless, the "monopolistic competition" which exists among the works may be very close to pure competition in the absence of externalities, collusion or restraints of trade by competitors. As Professor Mansfield states about competition in general, "...most firms face relatively close substitutes and most commodities are not completely homogeneous from one producer to another....In other words, there is no single homogeneous commodity called an automobile; instead, each producer differentiates its product from that of the next producer. This, of course, is a prevalent case in the modern economy."[36]

Thus, among certain classes of copyrighted works, there may be as much or more competition for consumer interest as exists among competitive hard goods or other "non-intellectual" properties. Competition among copyrighted works is assisted by the fact that although protection covers the author's specific expression, it does not extend "to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied...."[37] Although a copyrighted work must be "original," it need not be novel or non-obvious, which are requirements for patent protection.

4.7.1 Government Remedies for Market Monopoly

The problem of monopoly has arisen in the music and motion picture industries on several occasions but not in the context of control exercised by virtue of an exclusive right in a single property. The problem in these industries has invariably related to attempted control over a market due to exclusive rights in at least several properties, and in some cases, exclusive rights in very many properties. The example of the potential monopoly over phonorecord recording which resulted in the compulsory license provision of the 1909 Act has been mentioned previously and is also described in Appendix A, Section A.4.6.3.

A number of monopoly-related cases in the performing rights area are mentioned by Taubman.[38] ASCAP consented to an anti-trust decree of the U.S. Dept. of Justice in 1941 and the decree was further modified in 1950.[39] In the 1948 decision, (Alden-Rochelle v. ASCAP) "ASCAP was declared to have achieved monopolistic domination of the music integrated in sound films, in violation of Section 2 of the Sherman Act."[40] As a result, ASCAP "must license all qualified applicants, all licensees of the same class are charged the same fees, and any licensee or applicant

may request the Court [the U.S. District Court for the Southern District of New York] to review the fees charged." (See Appendix A, Section A.4.6.2.1.)

In general, the result of a threat of market monopoly is additional Government intervention and regulation. Both the phonorecord manufacturing and ASCAP situations have resulted in compulsory licensing requirements. In one case, the royalty fee was fixed in law by Congress; and in the other case, the Federal Judiciary, although not fixing the royalty payment, required that ASCAP must license all qualified applicants and must provide equitable treatment to all licersees, with Court jurisdiction retained as a place of recourse.

4.8 SUMMARY

Problems in the development and maintenance of an efficient market for copyrighted works have been considered and some remedies have been discussed. Problems considered have included exclusion costs, the costs of information and communication, trade-offs in the design of royalty collection systems, royalty pricing schemes, economic implications in the "fair use" doctrine, price setting for compulsory licenses, and economic monopoly.

The presence of transaction costs is not necessarily a reason for abolishing copyright, despite the cost of Government regulation. There are transaction costs in any market. Without copyright, it is postulated that there would be cut-throat competition, increased secrecy and a reduced flow of information. A society must select which set of dissatisfactions it finds less onerous or more contributing to its overall goals.

Clearinghouses are one method of reducing the costs of communication and information. Blanket licenses assist similarly, but there are costs to the use of these systems as well. That payment mechanism that is least costly in time and effort to users, all other things being equal, will probably generate the least amount of deliberate evasions.

There are efficient royalty pricing schemes that distinguish different classes of users and which account for both fixed and marginal costs. Pricing may usefully distinguish institutions from individuals and may usefully offer a choice of schedules to suit both the heavy user and the casual user.

Fair use may be treated as a mechanism for the reduction of certain transaction costs. However, the doctrine of permitting an exemption from royalty fees for "worthy" uses that do not come under First Amendment or "lack of market impact" considerations can be criticized on efficiency criteria.

Compulsory licenses have been established in three new areas under the 1976 Act. Price-setting of royalty fees for compulsory licenses is

essentially an adversary proceding between producers and users before an impartial panel empowered to set rates.

Copyright is a limited monopoly over a single work. In the markets for works of general interest (e.g. phonorecords, musical performances) anti-trust problems have concerned, in general, attempted control over many works. The results have been imposition of a compulsory license or judicial intervention.

5. COPYRIGHT IN COMPUTER-READABLE WORKS

Following the development in the preceding chapters, the questions of copyrightability in computer-readable data bases, full text, and computer programs may be considered. First some of the issues raised in 1967 hearings are reviewed, so that some of the arguments can be aired and the situation can be placed in context. Then, the current situation resulting from the passage of the 1976 General Revision is described. The issue of registration and disclosure is then considered in the context of public policy about information transfer.

The technical issues of copyrightability are then pursued, with the economic aspects of data base uniqueness and computer network distribution of copyrighted works considered. The conditions of sale of computer-readable works which need to be different than works in hard copy are discussed.

5.1 TECHNOLOGY FORECASTING, 1967 STYLE

The questions of copyright in literary works entered into a computer and of copyright in computer software were raised substantially in testimony before the Senate Committee on the Judiciary concerning revision bill S.597 in March 1967.[41] Authors and publishers appeared concerned by the possibility that, in the near future, a significant amount of publishing would be done in machine-readable format with extensive distribution of works accomplished by computer networks without hard copy. Clearly, there were serious copyright implications in this concept. Professor Jesse Markham, speaking on behalf of the American Book Publishers Council and American Text Publishers Institute stated that:

> "The present state of technology suggests that the computer will affect conventional publishing in two distinct ways: (1) The initial versions of some types of information that are reduced to writing, copyrighted and published, will very likely be computerized, thus by-passing conventional publishing altogether; and (2) The contents of published works will be stored in computers and, once stored, serve as a substitute for additional printed copies . . ."[42]

Similarly, Mr. Lee C. Deighton, also appearing on behalf of the American Textbook Publishers Institute, stated that:

> "The same kind of transmission [as closed-circuit television] is now technologically possible in computer network systems. It is contemplated that in these systems, a central computer will store copyrighted works, and that they will be transmitted by wire to hundreds of individual console screens upon demand. It is merely displayed on the console screen to be read at leisure by the user. The computer in effect becomes the library."[43]

Ms. Elizabeth Janeway, appearing on behalf of the Authors League of America, was more certain of the arrival of electronic publishing. "It is clear that computers and computer networks will soon become a principal means of disseminating much that authors write," she stated.[44] As a reference, Ms. Janeway cited a study Copyright and Intellectual Property published (in paper) by the Fund for the Advancement of Education.[45] This study was cited also by another testifier, Mr. Charles Gosnell, chairman of the Committee on Copyright Issues of the American Library Association and director of the libraries of New York University.[45] The cited study included the following quotes:

> "The library of the future will be unrecognizable to the librarian of today; it will be so dependent on the hardware of the new technology, that apocryphally speaking, the librarian of the future will be a mechanic with a screwdriver, ever alert to repair breakdowns in the service."[47]
>
> "Audio-visual dial-access teaching machines, operated by remote control, will provide hundreds and even thousands of students with simultaneous audio and visual access to a journal article or excerpts from a book."[48]
>
> ". . . the computer, in essence, assumes the role of a duplicating rather than a circulating library. One copy of a book fed into such a system can service all simultaneous demands for it; of course this substitution for additional copies will vitally affect the publishers' traditional market."[49]
>
> "The information world of the future will revolve around information systems, educational programs, and library complexes in which the complete documentation of the system concerned will be equivalent to a computer memory. In a sense, therefore, by providing copies of works stored in the computer, these systems become publishers. Traditional publications will also be available from commercial publishers, but it would seem that 'nonbook' production will predominate."[50]

The cited study quoted an article from the New York Times which was mentioned also by Professor Jesse Markham.[51] This article had reported that:

> "The medical libraries of three major eastern universities will be tied together in a network of computers and telephone lines to give scholars virtually instant access to their pooled resources . . . the three libraries will then contain 1,025,000 items. These can be searched by computers in seconds . . . When telecommunication and photographic reproducing devices are added to the network

> system . . . pages from a book in New York could be flashed to a user in another city and even reproduced for him in take-home form."[52]

The time scale in which these changes would come about was unfortunately not reported. The relative economics of the situation, such as the development and implementing costs as well as the operating costs relative to current systems, were similarly not reported. As of 1977, some publishing in electronic media is being done, particularly with data bases of various types. In addition, computers are now heavily used in the publishing process, e.g., typesetting and line justification. However, the vast changes contemplated by the above quotes have not materialized, although they might occur in the future. Certainly, the bulkiness of paper-based systems and library labor-intensivity are forcing functions. The costs of paper, of data and postal communications, and of computer programming, the sunk costs (economic and social) in current systems, and the psychological needs of readers to prefer one kind of media to another will be factors in the rate of change.

Not everything that is technically feasible is economically feasible or even desirable. As was reported by the National Academy of Sciences in 1971:

> "The primary bar to development of national computer-based library and information systems is no longer basically a technology-feasibility problem. Rather it is the combination of complex institutional and organizational human-related problems and the inadequate economic/value system associated with these activities."[53]

This means, in plain text, that decisionmakers didn't want it strongly enough to put up the money at that time.

5.1.1 Technology of the Future, Updated

Although the time scale implied by the predictions of 1967 was incorrect, the technological feasibility of what was described cannot be denied. Changes in prices among various elements of current and future systems plus additional technological breakthroughs may yet cause more electronic publishing than can be envisioned currently.

At present, the development of large-scale integration of logic elements and improvements in mass production technology have brought down the prices of central processor units of computers enormously. The capabilities of peripheral units have similarly been improved. The result is that the prices of some mini-computers of substantial capability are now equivalent to the prices of some automobiles. The sale of electronic home entertainment centers that involve substantial logic capability and which plug into TV sets have burgeoned. This is one step short of the home computer.

It may be that books will be sold on video disks the way phonograph records are sold, to be viewed on a TV screen controlled by a home computer. It may be that libraries will store many books in memory, and that hundreds of terminals will permit simultaneous reading by patrons on TV screens (with optional printout) of anything in the memory. The current uses of computer-assisted instruction and of computerized data bases may set the example.

However, the cost of computer software to accomplish the desired functions cannot be ignored, and it is not decreasing in cost. The cost of operating any computer system today is fast approaching a 90%-10% split in software and personnel versus hardware. In addition, it is likely that social, institutional, and psychological factors will have as much if not more control over the future in this area than technological and economic factors.

5.2 SOME TECHNICAL ISSUES IN THE HEARINGS, 1967

The issues raised in the Senate hearings in 1967 on computer-related works can be indicated in part, with reference to two points raised by EDUCOM (the Interuniversity Communications Council) in its statement entitled The Copyright Revision Bill In Relation to Computers.[54]

First, the EDUCOM statement opposed granting copyright protection to computer programs except in a very narrow sense. The statement said that "as the programs represent algorithmic plans for using machines to achieve practical results, they are poles apart from the conventional subject matter of copyright . . ."[55] Furthermore, the statement said that if a copyright were granted to a program, this should "in no event" bar an outsider from replicating the program exactly and using it "in order to carry out the process or practice the art."[56]

Second, the statement called for an educational exemption from infringement for entering copyrighted material into a computer, noting that there will be cases where the proprietor is not interested in making the needed transformation (to machine-readable form) and the institutions must have access to the work.[57]

The EDUCOM statement also called for retaining "traditional exemptions" in educational use of copyrighted works and suggested that the Revision Bill then being considered had provisions which "seem to eliminate virtually all preference for educational and related institutions utilizing copyrighted works by means of computers."[58]

The General Counsel to the Electronic Industries Association, Mr. Graham W. McGowan, also testified at this hearing.[59] Mr. McGowan testified that his organization favored exemption from infringement for computer input of copyrighted works (as distinguished from computer output). Among the bases of the argument were: (a) the author's reward should be based on demand for his work and that entering a work into a computer "is not attributed to the demand for the copyrighted

work"; (b) "when in a computer, a copyrighted work is not intelligible to any human being. Therefore, there is no harm to any copyright owner to put works in storage . . ."; (c) "to be required to seek permission to only store the work in a computer is time-consuming and expensive in and of itself. Having to deal with every copyright owner would be overly burdensome and highly impractical . . ."

The publishers point of view was perhaps summed up by this statement of Mr. Lee Deighton:

> "We have looked at copyright legislation not only as publishers but as citizens of a free economic society. We have observed a central thread running through the dialogue of the past three years. It is quite simply a demand for free use of copyrighted materials through the grant of special exemptions. It is our position equally with authors, composers, artists and other creative talents that the product of a man's mind and imagination is property just as much as the product of his hands or machines. Every exemption granted is an abridgment of the creator's rights to enjoy the fruits of his labor. As citizens, we are concerned lest the granting of exemptions proceed so far as to hinder the flow of creative materials."[60]

5.3 CURRENT STATUS, 1976 GENERAL REVISION

Several additional Congressional hearings and debates have been held since 1967. An analysis of the issues of copyright and the computer as seen in 1973 is available in a publication of the American Society for Information Science.[61] The recent history of copyright legislation may be obtained from the Copyright Law Revision Reports of the Congress (Senate Report No. 94-473 at pages 47-50 and House Report 94-1476 at pages 47-50). The net results of those hearings and debates at this time are embodied in the new statute P.L. 94-553, enacted October 19, 1976, to take effect January 1, 1978.

The law with respect to the use of copyrighted works in conjunction with computers would be considerably clearer at this time if it were not for the provisions of Section 117. That section says that the new Act has no effect on the use of copyrighted works in connection with computers. That means, in effect, that copyright law on computer use remains in doubt.

Section 117 was inserted because of the existence of CONTU, and the section is expected to be altered or eliminated as a result of eventual Congressional action on CONTU recommendations.

In any event, the new Act states, in Section 102, that "copyright protection subsists . . . in original works of authorship fixed in any tangible means of expression," and states, in Section 106 that "the

owner of copyright....has the exclusive rights....(1) to reproduce the copyrighted work in copies or phonorecords [and] (2) to prepare derivative works based upon the copyrighted work...."

That means that the right of conversion of a copyrighted work from one medium to another is reserved to the proprietor, excluding specific exemptions given elsewhere in the Act. It seems clear, then, if a copyrighted work can be converted to a computer-readable format without actually using a computer to do it, the converted work is protected. The law with respect to the use of the work in a computer or the conversion of a work to computer-readable format using a computer is not clear at present because of Section 117. Thus, if it were not for Section 117, the debate over infringement at input or output would be over. The copyright holders in the absence of Section 117 have control of their works in any medium (excluding specific exemptions) and therefore at input.

On the subject of the copyrightability of computer programs, the Copyright Office has been accepting programs for registration since 1964; although its Circular 61, Computer Programs, of latest date March 1975, states that certain issues about the copyrightability of programs are "doubtful." The two issues asked in Circular 61 are these:

> "(1) Is a program the 'writing of an author' and thus copyrightable, and
> (2) Can a reproduction of the program in a form actually used to operate or be 'read' by a machine be considered an acceptable 'copy' for copyright registration?"

The first question above references the Copyright Clause in the Constitution, not any particular Act of Congress. If computer programs are Constitutionally copyrightable, it seems clear at least that the human-written hard-copy form of an "original" computer program is copyrightable, barring specific denial by Congress, regardless of question (2) above.

Furthermore, if (1) above is answered in the affirmative, then in the absence of Section 117 of the new Act, the computer-readable version most likely would be considered a valid copy. However, because of Section 117, if the computer-readable version had been made with the aid of a computer, its copyrightability is clearly in doubt.

5.4 THE IMPLICATIONS OF ABOLISHMENT OF COMMON LAW PROTECTION

It was made clear in Section 2.1 above that common law copyright is ended in the United States as of the effective date of the 1976 General Revision. The concept now ending, dating back to Donaldson v. Becket, 1774, is that the author has complete dominion over his work with common law copyright protection before publication, but he must rely on statutory copyright following publication. Despite the fact that this "dual system" was unique among nations, it originally had considerable

appeal.

Specifically, the line of demarcation between works intended for general public distribution and those intended to be kept private was publication. Those works intended to be distributed publicly could be disclosed and given statutory copyright protection. Those works intended to be kept private were, at the option of the owner, not disclosed and not copyrighted under statute. Thus, for disclosure and publication, activities which made the work more susceptible to infringement, the copyright owner obtained the protection of the Federal Government. Without publication or disclosure, a proprietor could still make lease agreements with specific users involving nondisclosure which were enforceable in State courts under common law copyright (as well as under other types of protection).

Under the 1976 General Revision of Copyright Law, the legal distinction based on publication is ended. All works, "whether published or unpublished" are governed as of January 1, 1978 by the Federal copyright statute with regard to "all legal or equitable rights that are equivalent to any of the exclusive rights within the general scope of copyright" (Section 301(a)). On and after the effective date, "no person is entitled to any such right or equivalent right in any such work under the common law or statutes of any State" (Section 301(a)).

Thus, common law copyright protection in unpublished works is ended. However, unlawful activities "violating legal or equitable rights that are not equivalent to any of the exclusive rights within the general scope of copyright . . ." are still subject to the available "remedies under the common law or statutes of any State . . ." (Section 301(b)). The bill that passed the Senate, S.22, gave examples of unlawful activities against which remedies are still available. These included non-equivalent misappropriation, breaches of contract, breaches of trust, trespass, conversion, invasion of privacy, defamation and deceptive trade practices such as false representation. However, these examples were eliminated from the final bill as enacted. Therefore, the totality of exactly what remedies would qualify may be in doubt.

Since unpublished works are now copyrightable, a new definition was needed to define the onset of copyright. Now copyright in a work "subsists" (begins) at "its creation" (Section 302(a)) which essentially means from the moment that the last finishing stroke of creation is completed. Thus, even if the author does not wish copyright, his work has it from the moment of its completion if it is in a category of copyrightable works and the work is not otherwise exempted from copyright.

5.5 REGISTRATION AND DISCLOSURE

A copyright owner need not take advantage of copyright. He need not register his work with the Copyright Office if he does not wish to disclose his work publicly. Under the 1976 General Revision, registration is optional; but agreement to register involves deposit of the work with

the Copyright Office and therefore a certain public disclosure (Section 408). For works that have been published with a notice of copyright, there is the additional requirement at the option of the Register of Copyrights, of deposit of two copies for the Library of Congress (Section 407(a)). Unpublished works and works published without copyright notice are exempt from this latter requirement. Even if copies for the Library of Congress are demanded, this requirement may be circumvented by payment of a fine of $250 plus the retail price of two copies of the work (Section 407(d)).

The advantage of registration, under the 1976 General Revision, is that it is a prerequistie to an infringement suit (Section 411); and furthermore, awards of statutory damages are permitted only for infringements occurring after the date of registration of an unpublished or a published work; or for infringements occurring after the date of publication of a work and before the date of its registration if and only if the work is registered within three months of its date of first publication (Section 412).

Thus, the copyright owner has a trade-off. If he wants the maximum Government legal protection, he must register his work and disclose it to the extent of Government requirements. If he does not wish to register and disclose it, he need not; but in that case he must depend for protection, to a large extent, on lesser remedies or on remedies available through State courts that are not equivalent to copyright protection.

5.5.1 The Extent of Disclosure Requirements

The maximum statutory requirements for registration (of a literary work) must include, in the case of an unpublished work, one complete copy, and in the case of a published work, two complete copies (Section 408(b)).

However, the Register of Copyrights is authorized to permit, for particular classes of works (with classes defined by the Register), "the deposit of identifying material instead of copies . . ." (Section 408(c)(1)). Furthermore, "the Register of Copyrights may by regulation exempt any categories of material from the deposit requirements [for the Library of Congress]." (Section 407(c)).

Thus, the Register has been assigned regulatory authority which has very important public policy implications.

5.5.2 The Policy Implications of Disclosure Rules

There is in this nation an underlying philosophy that information transfer should be maximized, subject to certain restraints, such as those due to personal privacy, trade secrecy, and national security. In the area of scientific and technical information, Federal responsibilities are quite clear.

The National Science Foundation Act of 1950 authorized and directed NSF to "foster the interchange of scientific information among scientists in the United States and foreign countries."[62] In the same Act, NSF was given the authority "to publish or arrange for the publication of scientific and technical information so as to further the full dissemination of information of scientific value consistent with the national interest."[63]

In a report of the President's Science Advisory Committee, 1963, known as the Weinberg Panel Report, it was concluded that "transfer of information is an inseparable part of research and development."[64] In a report of the National Academy of Sciences, the SATCOM report, 1969, recommendations were made to insure effective communication of scientific and technical information;[65] and in the "Greenberger Report" of the NSF and the Federal Council for Science and Technology, 1972, technical information was referred to as "a vital national resource."[66]

The importance of information flow to modern society has been noted by important observers such as Daniel Bell and Peter Drucker. Bell has written that the United States is the first postindustrial nation and that "a postindustrial society is organized around information and utilization of information in complex systems, and the use of that information as a way of guiding the society."[67] Drucker has concluded that "knowledge, during the last few decades has become the central capital, the cost center, and the critical resource of the economy. . . Free trade in goods . . . is important. But free movement of capital and free movement of knowledge may be more important still."[68]

It would seem, therefore, that there is a strong public interest in maximizing disclosure on two counts: first, for the maximization of information transfer about original works, with all the implications for additional creativity that this implies; and second, to make meaningful the exchange of full protection of copyright for disclosure through registration. If registration is to imply a minimal disclosure, then the proprietor is capable of obtaining two opposite types of protection, surely not the intent of Congress. A permission for minimal disclosure would give full copyright protection; but, would permit the proprietor to maintain his work essentially secret, particularly if he makes it available through lease agreements only with restrictive disclosure clauses.

It is hoped that provisions for maximum disclosure in the public interest can be worked out without imposing difficult or costly tasks on copyrighted proprietors. This subject is further discussed below in connection with the characteristics of specific kinds of computer-readable works.

5.6 COPYRIGHT IN COMPUTER-READABLE DATA BASES

A data base, in many cases, is a "compilation." In copyright terminology, a compilation "is a work formed by the collection and assembling

of preexisting materials or of data that are selected, coordinated, or arranged in such a way that the resulting work as a whole constitutes an original work of authorship" (Section 101, (Definitions), 1976 General Revision). Compilations are copyrightable under Section 103 of the 1976 General Revision, but the copyright is in the organization of the materials and not in any used materials that are in the public domain or are already copyrighted. Copyright in the compilation does not imply any exclusive right in the preexisting used materials. As examples, a telephone book, a gazetteer, and an almanac are all compilations in which copyright subsists primarily in the organization of the materials and not in the individual materials contained therein.

This type of work has been given copyright protection in human-readable form as a type of literary work, one of the categories of protectable subject matter.

As the House Report 94-1476 makes clear (on page 54),

> "The term 'literary works' does not connote any criterion of literary merit or qualitative value: it includes catalogs, dictionaries, and similar factual, reference, or instructional works and compilations of data . . ."

The House Report goes on to state that "computer data bases" are also literary works with the implication that they are copyrightable, but for certainty about that question, the caveat "in the absence of Section 117" should be added. In the long run, however, Section 117 is certain to be excised or significantly altered, and therefore the caveat will be rendered moot. There seems to be no serious opposition to the copyrightability of compilations in computer-readable form.

Other literary works of a factual nature for example, encyclopedias and other reference works, may be used and treated as data bases even though copyright may subsist in the literary expressions in the entire works. A work of this type may be either a "collective work" like an encyclopedia, or a reference work on a specialized subject by a single author, e.g. Nimmer on Copyright. Copyrightability in the computer-readable form of the work is just as clear for these works as it is for compilations. The following discussion will concern computer-readable data bases in general without regard to their subcategory as either compilations, collective works, or literary works of a single author. The important connecting element of all of them is how they are used.

5.6.1 Publication Only in Computer-Readable Form

There may be some question as to what constitutes publication of a computer-readable data base that has not been published previously in a paper edition. It is assumed that the date of publication of a computer-readable data base that has been published previously in a paper edition without any change in content is the same date as that for the paper edition.

5.6.1.1 Display Only, Single Licensee: The particular situation of interest here is that in which the data base is made available only through user terminals attached to a central computer. This is a typical method of permitting accessibility. It is assumed that the central computer is owned either by the copyright proprietor or by a distributor who has obtained the data base from the proprietor under an exclusive license.

Now, if either the proprietor or the exclusive licensee make the data base available by display only at the terminals and do not permit printouts to change hands, no publication has occurred. The basis of this statement is the definition of "publication," in Section 101, and the explanatory material in House Report 94-1476 at page 138 and Senate Report 94-473 at page 121. (The pertinent sentences from both reports beginning "Under the definition in Section 101. . ." are identical):

First, the definition states that "display of a work does not of itself constitute publication." Thus the proprietor's display is not publication. However, the definition also states that "the offering to distribute copies . . . to a group of persons for purposes of further distribution . . . or public display, constitutes publication." Thus, distribution to a single exclusive licensee for display purposes only is not publication (since a single individual is not a group).

Suppose the proprietor distributed the data base to two or more licensees for display only. Whether this constitutes publication depends on how many licensees constitutes "a group " The answer to this question had best be left to the Judiciary or to further Congressional interpretation.

5.6.1.2 Printouts at Terminals: If users at terminals are permitted to make printouts of retrieved material, without any "explicit or implicit restrictions with respect to disclosure of the contents," then publication has occurred. The argument could be made that if restrictions are placed on disclosure or distribution of the printouts, then no publication has occurred. However, since the concept of "publication" is no longer central to copyright, extended analysis of particular situations is unwarrented at this point. In any event, it would be expected, if there is a likelihood that a printout would be considered "published," that a proprietor or a licensee would be sure to have the computer mark each printout with a complete notice of copyright to insure that proprietary rights were protected under Chapter 4 of the 1976 General Revision.

5.6.1.3 Identity of the Publication: The question of exactly what has been published remains to be discussed. The printouts, if provided under no restriction, are published material. The physical printout belongs to the user who paid for it. The copyright ownership of the printouts belongs to the proprietor of the data base. This is not unusual. When a book is purchased at retail, the buyer owns the book and the publisher continues to own the copyright in the content.

The argument could be made that only the printouts have been published and the data base has not been published. After all, only the printouts have changed hands; and it is assumed here that the proprietor or his exclusive licensee have retained control of the full data base. In the manner in which data base systems are operated, a user identifies a particular set of categories of information in which he is interested and queries the data base. The data base system responds with the number of items in the set, and on command, the text retrieved is shown on a CRT terminal. If the user is satisfied with the text retrieved, he requests a printout. It would seem that the printout is a "derivative work," similar to an abridgment or condensation (see Section 101 for definition), and there appears to be no requirement that a published derivative work be based on a published preexisting work. On the other hand, each printout may be different, depending on the specific query which the user has entered into the computer. Thus, the published "derivative works" may be one of a kind.

5.6.1.4 Needed Clarification: It seems reasonable to suggest that a clarification of what constitutes publication of a computer-readable data base is in order. For example, a reasonable understanding is that a computer-readable data base is to be considered "published" in its entirety if it is offered to the public on a query basis such that any item in the data base is capable of being retrieved and printed out and the printouts become the physical property of the users on the basis of unrestricted disclosure. Furthermore, "publication" occurs in this situation whether the offering to users is made by the proprietor or his licensee.

Additional clarification appears to be needed, also, in the definition of how many persons constitute "a group of persons" as the number of distributors to whom a work has to be offered in order to be published. Furthermore, it does not seem to be clear if a work is "published" if it is offered to a group of persons on a restricted-disclosure basis for further distribution on a restricted-disclosure basis.

5.6.2 Statutory Deposit to the Library of Congress

As was indicated in Section 5.5 above, there are valid public policy considerations that suggest the maximum disclosure of copyrighted works in return for copyright protection. There is no reason to exempt computer-readable data bases from these considerations.

The Library of Congress could be viewed in this connection as an archival location where anyone could view and peruse nearly any computer-readable work published with copyright notice. This would be an immense aid to scholarship, to historical review, and to the generation of new ideas for the future, as it has been with works in the older technological media.

The issue, then, is the form in which computer-readable data bases should be deposited under Section 407 in order to maximize their

availability, minimize storage and handling problems for the Library, not provide a hardship of supply to the proprietors and not strain fair use.

It is not immediately clear, on these criteria, whether the initial deposit should be a printout or a magnetic tape, but it seems reasonable to suggest that it should be the complete data base, not just identifying descriptions, regardless of which medium is chosen. The advantage of the printout is that any reader could peruse it without straining fair use. Microfilm could be used to reduce size and bulkiness. The advantage of the magnetic tape is that the data base is published in that medium; and it is a medium in which it is available for a scholar's manipulation and use, assuming it were an outdated tape that the proprietor no longer saw as an immediately marketable product that the scholar ought to buy by signing on the proprietor's computer system.

Many data bases are updated frequently, and it seems reasonable to suggest that a yearly update, containing only the new material added during the preceding year and the old material dropped, is not a burdensome requirement. The deposit of a complete data base, under the circumstances of continuous updating, could conceivably be required at least once in a period of several years, for example, ten.

5.6.3 The Question of Monopoly

In Section 4.7 of this report, the question of monopoly was discussed, and it was noted that the existence of an economic monopoly depends on the availability of substitutable works. In works produced for the general consumer, there may be high substitutability among individual works.

However, an important distinction must be noted between the respective market behaviors of the general consumer and the researcher-consumer of copyrighted works. The general consumer typically selects competitively for purchase or use one (or a few) of a class of relatively substitutable works while rejecting all others. The researcher in any professional field desires to be comprehensive in the full-text as well as in the data base literature of his field. Thus, the researcher (or his library surrogate) cannot reject totally anything pertinent, and his marketplace behavior with respect to competitive producers cannot be analogous to the general consumer. The question may be asked whether there is a greater potential for a market monopoly in this situation. If such is the case, a question that may be asked is what form of intervention should be pursued by consumers collectively or by the Government.

With respect to scientific journal articles, the situation is ameliorated through the formation of professional societies which serve as the collective good to circumvent the implicit market failure. Furthermore, the social ethic of research is that all those involved, even in different organizations, benefit from the unimpeded flow of information.

This ethic may tend to lower the prices of journals produced by scientific societies rather than raise them. Therefore, any independent entrepreneur of a proprietary journal may find that the subscription prices that can be charged are limited by competition from journals of non-profit societies. The fact that the primary producer community and the final user community of scientific journal articles are essentially the same population may be a key factor in preventing monopoly pricing.

With respect to bibliographic and other specialized data bases, a different situation exists. In contrast to the situation with scientific journal articles, there is very little in the publication of continual updates of a data base that can be translated by a professional researcher into either financial or symbolic remuneration unless the work is a full-time business. Thus the producer and consumer communities need not be the same population and this particular negative feedback restraint on the subscription price of journals need not hold for data bases. It is not surprising, therefore, to find that (excluding Government production) a significant fraction of data bases used for research purposes are produced and distributed for profit as proprietary products.

The development of computer-based information retrieval systems based on machine-readable data bases has added an additional complicating factor. First, the development of a computer-readable data base (with continual updating to insure an indefinite life) requires a certain investment in data collection, organization, manipulation, and digital conversion. Clearly, those organizations that already have computer-aided publishing systems to help produce hard-copy informational products may be able to generate computer-readable data bases as relatively inexpensive by-products. Secondly, a parameter of usefulness of a data base is the comprehensiveness of its coverage of a specific field; and conceivably, only the largest organization with well-established lines of data supply and customer acceptance may be able to satisfy this need.

Thus, the possibility exists that in some field of research, by virtue of economy of scale, an established system of suppliers and customers and already amortized costs of entry in the market, a single organization may achieve a virtual market monopoly over a class of nonsubstitutable computer-readable data bases. An anti-trust suit concerning this very problem is now under litigation in the field of computer-based legal information retrieval.

Additional sources of monopoly control and a potential solution are described in Appendix A, Section A.4.4.5 of this report. The following is excerpted from that Section:

> "In some instances, publishers of data bases have leased them exclusively for use in one computerized information service system . . . Exclusive licensing of data bases may tend to foster the monopolization of data base search services by one or two giant systems. Whether the prevention of such a monopoly

or the regulatory control of a permitted monopoly as a public service organization would be preferable is an open question.

> "From the standpoint of providing maximum service for researchers, and at the same time preventing the development of a monopoly . . ., the ideal situation might be the development of a number of competing systems, each of which can offer comprehensive coverage of any subject area. One way of encouraging such a development would be to provide for a compulsory licensing scheme under which a data base made available for use in any one system would thereupon become available for use in all other systems.
>
> "Whether a compulsory licensing scheme . . . is needed and whether is would be desirable, are debatable issues . . ."

It seems reasonable to suggest that a valid research subject at this time is the economics of provision of data base information in computerized form, considering both the incentives for innovation and the potential for monopoly pricing.

5.7 COPYRIGHT IN COMPUTER PROGRAMS

Some of the questions concerning the copyrightability of computer programs are first listed below and then are considered individually in some detail. These questions are:

(a) Is a computer program a writing of an author and thus eligible for copyright protection under the Constitution?

(b) Is a computer program a "literary work"?

(c) Can a computer program be sufficiently "original" that it meets the requirements for a copyrighted work?

(d) Should a program in object code be treated any differently under copyright than a program in a source language?

(e) Is protection of the specific expression of a program but not the underlying conception sufficient protection to be valuable?

(f) Should copyright protection be denied computer programs on the basis of the strength of the software industry?

(g) How long should protection last, if a program is copyrightable?

(h) What should be a buyer's usage rights in a program?

5.7.1 The Program as the Writing of an Author

In general, a computer program is written by a human being, and is written in a specific formal language. Those persons engaged in the occupational specialty of writing programs are known as programmers. Others engaged in the tasks of determining requirements for and blocking out the logical flow of programs may be known as systems analysts. However, engineers, scientists, and others may write programs in the course of using a computer to assist them in solving problems in which they are engaged. In the United States today, there are probably several million persons who can comprehend at least superficially a computer program written in FORTRAN, a widely-used programming language.

In opposition to the copyrightability of computer programs, the point has been made that a computer program is a set of instructions for a machine, and in fact, according to this view, since the machine cannot operate without the program, the program is really part of the machine. Thus, programmers are really engaged in machine design, according to this argument, and the output of their work is more appropriately protected under a different legal mechanism than copyright.

Several points can be made in rebuttal to this line of reasoning. First, there is nothing inherent in a computer program that cannot be carried out by human labor, given either enough time or enough people to undertake the work. That is, the computer program written by a programmer is a set of instructions understandable by other persons; and it consists of individual steps that are possible to accomplish by humans, if time restraints are relaxed. The only capabilities needed to carry out the instructions of a program written in a typical source language, besides an understanding of the language, are (a) the ability to distinguish negative, zero and positive numbers, (b) the ability to perform arithmetic and elementary Boolean algebra, and (c), the ability to correctly select the next instruction, given explicit and unambiguous directions as to where to find it. It hardly seems fair to the author of such a set of instructions or to the public interest in economic efficiency to deny Government protection to the author's expression simply because, for purposes of speed and accuracy, the instructions are to be carried out by machine instead of by human labor.

If it is to be put forward that computer programs are not in a language in which humans speak to each other, that point can be accepted without damaging the case for copyrightability. Categories of works now copyrightable include musical works (that is, sheet music not necessarily including any accompanying words); pantomimes and choreographic works; and pictorial, graphic and sculptural works. None of these communicate to humans in natural language. Certainly included in the category of pictorial and graphic works are engineering and architectural drawings and schematic diagrams, all of which can be employed as instructions to those persons engaged in the construction of machines, devices, and structures.

Close to the concept of the computer program is musical notation and similar notations for sequences of choreographic motions. Musical notation is, in essence, a set of instructions for the operation of mechanical devices so as to produce a particular sequence of sounds, each with a particular pitch held for a particular length of time. It follows that the question whether a computer without its program is still a computer is analogous to the question whether a piano without someone playing it is still a piano. Discussion of such a question is not likely to be fruitful in the present context.

It may be helpful to point out, however, that a computer program is more than simply a set of instructions used to operate a machine. Computer programs are involved, in their operational use, in a variety of real human purposes. Some of those purposes involve research and other professional activities, while other purposes may appear to be mundane. However, the development of a computer program that will be used in connection with any real human purpose must include an understanding of the human and physical systems with which the program will be associated. Implicit in any set of calculations that represent the real world is a model of that portion of the real world. Clearly, the computer programs now in use throughout the United States that assist physicians in the diagnosis of heart ailments on the basis of an analysis of electrocardiogram signals constitute models of the heart's operation. Similarly, but perhaps not so obviously, accountants have begun to realize that the system of financial records of an organization including the records of collections, inventory, and disbursements is nothing less than a financial model of the organization.

In effect, the computer program is an implementation of the view that the physical world and at least part of the human world is amenable to rational analysis and quantification, and to understanding deduced from these processes. Scientists, engineers, economists and statisticians must be listed among those whose core of professional work conforms to this view. No person need accept this view either in its entirety or uncritically. In fact, a world run solely on the basis of this view might very well lack fundamental and essential value judgments that cannot be deduced or quantified. Copyright protection, however, as discussed in Section 2.6, requires no value judgment as to the individual merit of a particular writing of an author; and it is clear that the source code written by a programmer is such a writing.

While the most fundamental statutory test of copyrightability is whether the category in question constitutes a writing of an author, it is useful to consider the basic principle enumerated in Section 1.3 of this report. Under these principles, this study finds that the author of a computer program is entitled to the fruits of his creation; and that the ease of copying of this form of intellectual property constitutes an intrinsic market failure requiring the public good of statutory copyright protection. In addition, this study finds that without copyright protection for computer programs, losses in information flow, increased procedures for secrecy and less opportunity for creativity

would result.

5.7.2 Computer Programs and Literary Works

Seven categories of works are now granted protection under Section 102 of the 1976 General Revision of Copyright Law. While the definition of "literary works" given in Section 101 of the new Act is broad enough to include computer programs, it is not necessary that computer programs be defined for purposes of the statute as literary works. An alternative is a new category of copyrightable work to be enumerated in Section 102, namely "computer programs."

One reason for consideration of this question is that computer programs are used in different ways than prose or poetry. The limitations on exclusive rights granted to users of literary works, for example, as specified in Section 110 of the 1976 General Revision, may or may not be appropriate for computer programs. In particular, the applicability of the limitations of Section 110 to computer programs used for computer-assisted instructional purposes is worthy of examination.

Similarly, as the uses to which computer programs are put or the manner in which they are used differ from more standard literary works, additional modifications of the copyright statute may be appropriate to specify the assignment of property rights with respect to each type of work. Categorization of computer programs separately from literary works might assist the process of specifying these differences.

5.7.3 Originality of Computer Programs

While no specific research study can be identified yielding definitive results that computer programs can be "original", as the meaning of that term is understood in copyright law, experience and knowledge of the field make possible an unequivocal affirmative response.

Many books have been written on the subject of how to write programs and how to write better programs. If originality were not possible, it would have been difficult if not impossible for Gerald M. Weinberg to have written the book The Psychology of Computer Programming[69] including sections on "Programming as Human Performance" and Programming as an Individual Activity." Similarly, it would have been far less likely for Dennie Van Tassel to have written on "Program Style" in his book on Program Style, Design, Efficiency, Debugging, and Testing[70] or for Frederick P. Brooks, Jr. to have written of "the joys of the craft" or of "craftsmanship" in his book on The Mythical Man-Month, Essays on Software Engineering.[71]

Of course, the more complex a program's function, the greater the variety of unique ways of expressing the steps in the performance. On the other hand, it is questionable whether a program carrying out an elementary and well-defined function such as the calculation of the roots of a second-order polynomial could be considered "original." It may be

within the discretionary power of the Register of Copyrights to deny copyright to such a program on that basis. It is likely, however, that the copyrighting process will be self-regulating. Only programs having an intrinsic originality are likely to be submitted for registration.

5.7.4 Protection of Object Code as a Computer Program

The object code is the conversion into symbols usable directly by the computer of the source program written by the programmer. The basic question with respect to object code is whether it should be able to be copyrighted independently of the source code. If it were independently copyrightable as a computer program, a programmer could submit the object code to the Copyright Office for registration and never disclose the source code at all.

The point has been raised that, very likely, the sequence of ones and zeros in hard-copy form constituting the object code is, in the abstract, already copyrightable as a literary work under present law. Analogously, the sequence of numbers in a data base are clearly copyrightable and similarly, original sequences of nonsense syllables are acceptable for registration since no value judgment need be made as to literary merit.

However, the concept of a "computer program" implies a sequence of instructions involving a solution to a quantifiable problem. The granting of the protection of copyright implies the right to prevent infringements and imposes responsibilities on the Government. Yet the object code (except for a program of very short length) is unreadable as a computer program by a person. It would be exceedingly difficult for the Copyright Office to assure that the object code was "original" for registration purposes and similarly difficult for the facts to be determined in an infringement action.

The registration of the sequence of ones and zeros constituting the object code could be used, certainly, to prevent unauthorized copying and use of exactly that sequence. However, many infringements of the underlying program could occur without the use of the exact sequence. For example, it would be extremely easy to shift the specific sequence while still plagiarizing the program through the insertion of a single instruction not changing the logic of the sequence, or to change the encoded addresses of operands, or to use different encodings for the machine commands. A copyright registrant might find that object code registration actually provided, as a practical matter, very little real protection.

In addition, copyright registration of object code as a computer program discloses almost nothing in return for the protection of law. Information transfer about the program is deliberately minimized, not maximized. Thus, this study finds that the independent copyrightability of object code as a computer program is not in accord with the basic principles on which its recommendations are based.

On the other hand, the above should not be understood as implying the finding that object code is not protectable at all. The copyrightability of programs in source language would have very little value if the object code could be produced or copied with impunity. It is concluded, therefore, that the conversion of a source program into object code, which implies no addition to the logic of the program and therefore no value added, constitutes the making of a copy.

Thus, object code should be protected by virtue of the copyright in the source program. It may be noted that in the process of producing object code from a source program, the usual procedure is to combine certain necessary operating parameters into the object code. These parameters often select the specific peripheral units that will be used with the program when the program is run and also select the location of the program in the computer storage units. In the view of this study, these additions to the object code constitute almost nothing that could be classed as original works of authorship. Thus, the generation of object code, even with the addition of these housekeeping functions, cannot be classed as the preparation of a derivative work.

5.7.5 Translation To a New Source Language

The translation of a source program from one source language to another source language should be considered the preparation of a derivative work. The translation makes possible the understanding of the program by an additional group of persons and provides for wider dissemination and use.

5.7.6 Value of Copyright Protection

It is clear from the concept of copyright and from Section 102(b) of the 1976 General Revision that only the "expression" of a program can be protected. As stated in Section 102(b):

> "In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work."

The question may be asked, whether protecting the expression only, rather than the concept is valuable. An answer is that copyright protection hopes to prevent a major type of market failure with regard to computer programs, but does not claim to protect against all types of market failure. Therefore, copyright is valuable, but not valuable for every purpose.

It is important to note that unauthorized copying of computer programs, even without any further use or dissemination of the concepts of the program, is a major type of market failure. The reason this is true is that examination of the program code to determine any unique concepts

contained therein requires the expenditure of significant resources, while copying by itself requires only a bare minimum of resources. A copier who is assured that the program in question performs the functions he desires in an error-free manner has obtained something of considerable value, at minimum expense. The added effort of understanding any unique procedures contained in the program is not likely to yield a corresponding advantage for a pragmatic user.

The disclosure of unique concepts, certainly, will assist competitors in the development of competing programs, but whether a particular unique or innovative design concept is protectable would depend on how a statute (such as the patent law) protecting such concepts might be written or might be interpreted. This report is not the proper vehicle for a detailed discussion of this matter; but it can be pointed out that very few programs contain (or need to contain) new concepts as unique as the simplex method for the solution of linear programming problems or the fast fourier transform algorithm, both outstanding advances in computational procedures. For the most part, what is required of programs is that they carry out their intended functions with precision and in an error-free manner. Performance is improved if in addition, programs minimize execution time and use of storage space to the extent practicable. For most applications, unique concepts are not required, and for these programs, copyright protection should be sufficient. Clearly, there appears to be room for further study on the possible protection of unique and innovative programming concepts.

5.7.7 Copyright and Software Industry Strength

One argument against copyrightability of computer programs is that the industry is burgeoning and therefore copyright is unnecessary. It must be noted, however, that copyright does not specifically protect an industry, but rather a particular work in the marketplace. The protection is particularly important for the smaller entrepreneur who does not have the resources to engage in the kind of retaliatory measures suggested by Hurt and Schuchman or to protect himself against the predatory practice proposed by Breyer and described in Section 4.2 above. Copyrightability promotes competition and innovations by the small competitor. These aspects of the marketplace are important criteria for public policy towards an industry, as are growth and size of the industry.

5.7.8 Duration of Copyright Protection

It seems reasonable to propose that the author of a computer program should not be treated any differently than the author of any other type of copyrightable work. Therefore, the duration of copyright in computer programs should be the same as the duration of copyright in other works.

A reason that has been given for proposing a shorter duration of copyright is that with changing technology, computer programs would become valueless after several years. However, if the proposal of this report is adopted, that an original computer program copyright should be

obtainable only in the source program, and not in the object code, then a separation of the programmer's expression from the hardware technology is promoted. Furthermore, even if popular source languages are altered or improved, the copyright proprietor retains the right to prepare derivative works, permitting him to update the program as required.

5.7.9 User Rights in Computer-Readable Works

A computer program, and a computerized data base as well, are intended for use in conjunction with a computer. That is, a computer-readable work is used by entering it into a computer system and manipulating it through the logic of a computer. It seems reasonable to propose that the copyright proprietor should retain the exclusive right to the use of a computer-readable work in a computer.

However, this study proposes a limitation on the exclusive right of use, in order to reduce transaction costs in connection with the transfer of ownership of copies of computer-readable works. This limitation is intended to operate through improved salability of computer programs and computerized data bases, considered immediately below.

5.8 IMPROVING SALABILITY OF COMPUTER-READABLE WORKS

Several kinds of copyrighted works are offered for sale at retail. Books, maps, and sound recordings are typical of this class. The advantage of sale over lease or rental is that transaction costs are minimized. No agreement, except to pay the retail price, need be made. The buyer obtains ownership over the copy or phonorecord he has purchased, including the right to resell that copy, except for certain rights retained by the copyright owner. The retained rights include the rights to make and sell copies (with exemption for fair use, compulsory licenses, etc.), the right to prepare derivative works, and the rights to perform and display the work publicly.

If the rights to computer-readable works could be defined in such a way as to promote the sale rather than lease of such works, transaction costs might be similarly minimized. This would be, certainly, in the public interest.

5.8.1 The Right to Ephemeral Recordings

One of the problems in the sale of computer-readable works is the right of the buyer to copy for his own use. Here, "buyer" means the purchaser of a copy where ownership of the copy is transferred. For works published in paper, "use" simple means "reading" and no copying is required. For sound recordings, "use" means "playing" the recording on a playback mechanism, but again, no copying is required. For computer-readable works, copying into the computer is required in order to use, and in addition, archival copies are made in normal practice in case a copy in use is destroyed inadvertently.

In Section 112 of the 1976 General Revision, the right to ephemeral recordings is recognized for a "transmitting organization." This means that a radio station or TV station has the right to record a performance that it is transmitting for its own internal purposes, for example, "for purposes of archival preservation or security."

It seems reasonable to suggest that buyers of computer-readable works ought to have similar statutory rights of ephemeral recording in order to be able to effectively use what they have bought. It seems reasonable to suggest, also, that restrictions on the use of such ephemeral recordings ought to be imposed. For example, if a buyer resells the copy of the computer-readable work that he has bought, he ought to be required to destroy all ephemeral copies. The buyer ought to be able to resell no more than one copy of a computer-readable work if he had bought only one copy. Furthermore, the right of internal use should be distinguished from network use. The usage rights of a buyer should not include the right to make the work available to outsiders through a computer network or otherwise.

The effect of the allowance for free internal use in situations of transfer of ownership means that there could be no performance royalty charged. If the seller wants the buyer to pay for each individual use of the computer-readable work, the seller would have to negotiate a lease or rental agreement with the buyer. For lease with per-use charges, the transaction costs are probably higher than for outright sale.

5.8.2 The Right to Make and Use Machine Code

Similarly, the need of a buyer to copy a computer-readable work into a computer in order to use it requires that the buyer make object code out of the work. It seems reasonable to suggest, in order to promote the sale of computer-readable works and thereby reduce transaction costs, that a buyer be permitted, for his own use, to convert a computer-readable work to object code and to use the code in his own computer.

5.8.3 Differential Pricing

Another concept which might induce an increase in sales rather than leases is differential pricing between individual buyers and institutional buyers. This concept has been described in Chapter 4 of this report as having a theoretical economic basis, and the concept is further described in Appendices C1 and C2. The concept, in general, has been described in terms of the sale of scientific journals, but there is no reason why the concept could not be adapted and utilized for the sale of computer-readable works, as proposed in Appendix D.

In general, an individual buyer would be one with a single computer system and a small number of terminals. For the sale of computer programs, that is, computer-readable works that are typically manipulated

by the arithmetic units of computer systems, an institutional buyer could be defined as one with a large number of computer systems on which the program might run or as one who could be expected to use the program to benefit many individuals. For the sale of computer-readable data bases or textual works, that is, works that are typically viewed at terminals with subsets being retrieved by users, an institutional buyer could be defined as one with a large number of internal (user) terminals attached to his system.

5.8.4 Data Base Access Services

A special type of institutional buyer must be noted. The independent data-base access service employs a computer-readable data base, and for a use-dependent fee, permits outsiders to obtain printouts of subsets of the data base at external user terminals.

The data base access service is providing derivative works to outsiders through the printouts, as well as displaying the work publicly, two rights which are reserved to the copyright holder under Section 106.

In order to make the concept of outright sale useful to independent data base access services, these services would have to be given statutory permission to display computer-readable works publicly and to prepare derivative works. It is not clear that copyright proprietors would want to give up these rights in this situation.

5.9 SUMMARY

The issue of computer-readable works was raised significantly in Senate hearings in 1967. Predictions of vast changes in methods of production and distribution of works alerted publishers and authors to the need for language in the copyright law which protected their works in computers. The predictions were premature, but technically feasible, and within the realm of possibility, depending on many social, economic, and psychological factors.

The 1976 General Revision clarified rights in works fixed in any tangible medium, but the insertion of Section 117, because of the establishment of CONTU, continued certain ambiguities. The 1976 Act abolishes common law protection for fixed, but unpublished works and provides statutory protection instead.

The most important act assuring maximum Federal protection is registration of the copyright and deposit of the necessary copy. Disclosure through this act is an important *quid pro quo* for Federal protection.

The Register of Copyrights is entitled to make rules allowing the deposit of identifying information instead of complete copies for certain classes of work. The principle of maximum information transfer would seem to demand complete disclosure for scientific and technical information.

Data bases should be copyrightable in any medium of expression. Clarification is needed as to what constitutes publication for a data base distributed only in computer-readable form to one or a small number of computer systems that provide user-access via a terminal query.

There is a need to review the possibility of monopoly pricing in computer-readable, data-base access services. Some of these data bases are relatively nonsubstitutable, and competitive entry in the field may be difficult. Compulsory licensing may be a remedy but innovation should not be stifled.

Computer programs should be copyrightable in human-readable form (source language) in any tangible medium of expression. The object code should be protectable as a copy of a computer program, but not as an original copyrightable computer program by itself, because it fails to disclose anything substantial. Material defining the language of a computer program should be disclosed at time of registration. For most computer programs, copyright protection is sufficient because the programs contain no innovative concepts. Further study may be worthwhile to determine the value of protecting the innovative concepts that might be contained. The duration of copyright for computer programs should be no less than the duration of protection of other works. This should promote the writing of programs in enduring languages. The definition of a program converted to a new source language as a derivative work will help extend the life of programs.

There is a need to insure a user's rights in computer-readable works if the user has purchased the work in outright sale. The sale of copyrighted works rather than lease or rental should be promoted as being lower in transaction costs. A buyer needs the right to make source-language copies for his internal use and the right to make and use object code. The buyer would not be permitted to resell more than the number of copies he had purchased nor make the work available externally to others on a computer network without permission. At the time of resale, extra copies would have to be destroyed.

6. POLICYMAKING FOR COPYRIGHT

In the course of this project, it was recognized that if conclusions were to be drawn about the applicability of copyright to computer-readable works, then decisionmaking with respect to other kinds of copyrightable works ought to be researched. Therefore, an historical analysis was undertaken, and the fundamental principles and concepts underlying copyright were reviewed.

This historical and conceptual study has been found to be extremely useful. It has elucidated the principles of political philosophy and economics on which copyright is based. It has clarified the roles of the separate branches of the Federal Government in copyright policymaking and demonstrated their interactions. It has identified the impact of incremental technological change, thereby showing decisionmaking under increasing complexity. Finally, it has enabled copyright policymaking to be placed in the matrix of decisionmaking in general, thereby making possible an identification of the political system models with which it is most closely associated.

6.1 COPYRIGHT AND OTHER PROPERTY RIGHTS

The history of copyright presents evidence that an essential point at issue, regardless of the technology involved, is the definition of the boundaries of the property right. In this, copyright is not much different than other kinds of property, tangible or intangible. In addition, with the property right is typically associated reciprocal responsibilities. An example of the conception of property rights in this manner is presented by Walter Lippmann in The Public Philosophy; in which the concept of *quid pro quo* is stated to be fundamental to our system of government:

> "Early in the history of Western society, political thinkers in Rome hit upon the idea that the concepts of the public philosophy - particularly the idea of reciprocal rights and duties under law - could be given concreteness by treating them as contracts. In this way, freedom emanating from a constitutional order has been advocated....by establishing the presumption that civilized society is founded on a public social contract.
>
> "A contract is an agreement reached voluntarily, *quid quo pro* and likely, therefore, to be observed - in any event, rightfully enforceable..."[72]

Copyright appears at first glance to be encumbered with many kinds of conditional rights and complexities, whereas other property rights may appear to be relatively clean and easily defined. Actually, this is not so. A farmer may be restrained from using insecticides if his neighbor is a beekeeper and may be induced by Government to plant or not to plant certain crops. A builder may be restrained from constructing

a factory in a residential neighborhood. Airplanes may be confined to certain corridors for purposes of noise abatement and places of business must meet many standards of safety and occupancy.

In general, the rights of property are the creation of law. Lippmann has quoted Blackstone's Commentaries on this question:

> "The original of private property is probably founded in nature....but certainly the modifications under which we at present find it, the method of conserving it in its present owner, and of translating it from man to man, are entirely derived from society, and are some of those civil advantages in exchange for which every individual has resigned a part of his natural liberty."[73]

Thus, people may act from a foundation of what they believe to be naturally right, but one view is that enforcement of those rights is derived from the public social contract, through which some liberty is exchanged for some protection of law. Copyright appears to assume such a social contract.

6.2 APPLICABLE DECISIONMAKING MODELS

6.2.1 Pluralism

It seems clear that decisionmaking on copyright questions has been very much in the pluralist mode in the twentieth century. That is, conflict has been among contending factions (interest groups) gathered around different functions related to copyrighted works. For the most part, the contenders have been the primary producers, i.e., authors and their original publishers, against secondary producers, that is, those who would use copyrighted works to provide ultimate consumers with additional products and services. In general, the Congress refers to the secondary producers as "users" although they are not the ultimate consumers. The secondary producers have included phonorecord manufacturers, jukebox owners, movie makers (in the use of copyrighted music in sound tracks), over-the-air broadcasters, cable TV broadcasters, educational photocopiers (for further distribution to students), and Government librarians (for further distribution to researchers).

The ultimate consumers are usually not involved, although users of computer programs and researchers in educational institutions who use photocopies have been involved. Neither of these groups can be identified with the general public consumer of copyrighted works, e.g., the general buyers of books, records, movie tickets, concert tickets, etc.

The governmental role envisioned by the pluralist model is:

> "(1) establishing rules of the game in the group struggle, (2) arranging compromises and balancing interests, (3) enacting compromises in the form of public policy, and (4) enforcing these compromises."[74]

There is no question that Congress and the Judiciary have served these purposes in copyright decisionmaking. In fact, the idea of group compromise is no secret in this field. The 1976 General Revision of Copyright Law calls upon the Register of Copyrights to submit a report to Congress "setting forth the extent to which this section [108] has achieved the intended statutory balancing of the rights of creators, and the needs of users." Thus, the balancing concept is specifically written into law in the photocopying area. Similarly, House Report 94-1476 on page 65 speaks of the definition of "fair use" [Section 107] as "balancing the equities."

The setting of the royalty rate for the phonorecord manufacturing license between the 3¢ per musical piece manufactured asked by some representatives of the publishers and writers and the 2¢ requested to be retained by representatives of the record manufacturers, and the further compromise between the Senate-passed royalty fee and the House-passed royalty fee is an additional example. The statutory balancing of the membership of the National Commission on New Technological Uses of Copyrighted Works is another example; and in the statement contained within House Report 94-1476 on page 360, the Hon. George E. Danielson states (about Section 111) that:

> "....the committee has arrived at a solution which I submit is fair and equitable to both the owners and the users of copyrighted materials...."

It can be reasonably expected that decisionmaking will continue in a primarily pluralist mode for the foreseeable future in order to resolve disputes in which a balance of equities is the primary consideration. Probably, the Copyright Royalty Tribunal will be aided in its efforts by a rational analysis of economic issues.

6.2.2 The Power Arena Model

Professor Theodore J. Lowi has defined domestic policies as falling into one of three arenas of power: distribution, regulation, or redistribution. Lowi states that:

> "distribution [was] almost the exclusive type of national domestic policy from 1789 until virtually 1890. Agitation for regulatory and redistributive policies began at about the same time, but regulation had become an established fact before any headway at all was made in redistribution."[75]

Distributive policies are those decisions that can be made in the short run without regard to limited resources. The standard example is 19th century land policy. Distributive policies are typically capable of disaggregation so that what is being distributed can be dispensed in small units. Under distribution, indulged and deprived may be members of the same group (i.e. the winner and loser of a Government contract or grant).

Regulatory decisions normally affect an entire industry and often concern the ability of that industry to do business in the long term. Within the context of the regulatory structure, there may be distributive decisionmaking (e.g. assignment of a TV channel or an airline route), but regulatory decisions typically affect all industry members in a similar manner. Often, the regulatory policies affecting one industry are of little concern to other industries.

The redistributive arena, according to Lowi, involves issues that concern "haves and have-nots, bigness and smallness....."[76] Typical issues that appear in the redistributive arena are overall tax policy and policies on unemployment and retirement income. Industry groups concerned with separated regulatory policies are likely to find a common ground in the redistributive arena.

The importance of the power arena model is in what it says about the changing nature of copyright decisionmaking. In 1790 and until about the time that Lowi dates the beginning of regulatory policies, copyright fitted neatly into the distributive arena. The contention among factions was not a primary factor. Clearly, individual copyrights have been and will continue to be dispensed in small units in the short run without regard to limited resources. In fact, copyrights (and patents) may be the ultimate distributive good since originality and creativity are essentially independent of resource constraints (although nurturing these qualities may not be). The increase in registered copyrights and patents does not diminish the stock of un-issued copyrights and patents waiting for new claimants.

While the distribution of copyrights continues, it seems clear that much copyright policymaking since the turn of the century has been in the regulatory arena, and is increasingly so. This has been due to the increasing number of secondary producer groups ("users") who have been contending the boundaries of intellectual property rights with primary producers. Each field of copyright has its own contenders, and major decisions in each field treat all producers in the same way, as the regulatory arena requires. Not surprisingly, Lowi recognizes that his regulatory arena is very close in concept to the pluralist model of policymaking.

Another factor causing an increase in regulatory policymaking in copyright is the increase in the sensitivity of public decisionmakers to monopoly and other forms of market failure such as high transaction costs; and the consequent increase in public institutions and mechanisms involved in correcting these market problems. Thus, there are now four compulsory license types within the copyright domain, a Copyright Royalty Tribunal to oversee certain aspects of these licenses, and a Federal court supervising the performing rights area. It remains to be seen if the photocopying problem can be successfully concluded with a collective mechanism that does not involve additional, permanent Federal intervention; and final Congressional action in the area of computer-readable works is yet to come.

Very little about copyright is directly in the redistributive arena unless the truism is cited that, in the long run, all policies are redistributive. It could be said, however, that activities that prevent monopoly pricing of copyrighted works are redistributive since prices affect the ultimate consumer. At the same time, it may be noted that, except for anti-monopoly and infringement prosecution activities in the Department of Justice, the only Executive Branch concern with copyright is as a peripheral policy issue that may affect research through the availability of data and scientific journals, and may affect TV viewers in the quality of available programs. There is no administrative "program" about which one could make cost-benefit calculations with concern for objectives achieved in relation to funds spent. Copyright is now primarily a regulatory balancing issue involving producer interests and special classes of users, and is likely to remain so. Congress appears to regard the balancing of equities in copyright as a distinct function reserved to itself.

The future cannot be predicted with any certainty but it is possible that additional technological change, coupled with increases in the costs of resources such as raw materials, may bring copyright policy-making more into the redistributive arena. If that occurs, it is likely to be in a context in which copyright is an element of a more consumer-oriented issue, such as "public access to information."

6.3 THE IMPACT OF TECHNOLOGICAL CHANGE

It is most interesting that Lowi dates the beginning of the regulatory policy era at approximately the start of growth in innovations of information technology. The effect of new innovations is to make available new opportunities, which means in economic terms, new industries and increases in investment and employment; but which means in political terms, increases in the number of interest groups and the consequences of their activities.

Furthermore, another effect of new innovations is to make ambiguous the definitions of property rights that were perfectly clear before the innovations. As John Dewey stated many years ago,

> "Every thinker puts some portion of an apparently stable world in peril and no one can predict what will emerge in its place."[77]

Thus, "public performance for profit" has an entirely different meaning after the commencement of commercial broadcasting than before. "Fair use" has an entirely different meaning after the diffusion of high speed photocopying than before; "copy" a different meaning after the invention of punch cards and magnetic tape than before.

It seems completely in the spirit of free enterprise for an innovator to attempt to combine a new technology with the new ambiguity or uncertainty it raises in order to develop a new market and a new industry.

Should the innovator succeed, a new interest group is formed around the successful technology, but the proliferation of interest groups must generate additional conflict in the contention for the same property right.

Consequently, the nearly inevitable result of the successful introduction of new technology is increased regulation as contenders pursue their rights through the Judiciary and Congress. This is happening with information technology and copyright as it has in other fields. To quote from Professor David Truman in The Governmental Process:

> "The causes of this growth [in organized interest groups] lie in the increased complexity of techniques for dealing with the environment, in the specializations that these involve, and in associated disturbances of the manifold expectations that guide individual behavior in a complex and interdependent society. Complexity of technique, broadly conceived, is inseparable from complexity of social structure.."[78]

Thus, complex ways of using information technology, for example by amplifying distant TV signals and distributing them by cable to viewers, or by abstracting scientific articles, combining them with key words and distributing them to researchers via terminals attached to a computer with a logical query system, must involve complex rules of property rights in a society where such things are important.

By setting priorities that establish the importance of a balance of property rights, rational decisionmakers must then establish a working regulatory system that minimizes transaction costs but allows for the balance of rights established. This may be a complex system of rules, and if the rules appear to be difficult to follow or enforce, perhaps the priorities must be reviewed. Care must be exercised, however, so as not to throw out basic principles simply for the sake of simplification.

6.4 THE PUBLIC INTEREST AND COMPUTER-READABLE WORKS

In proposing recommendations for the application of copyright to computer-readable works, a set of criteria must be used. It seems reasonable to suggest that the overriding criterion must be "the public interest," however, that may be defined.

One aspect of the public interest is how decisionmaking affects the individual citizen. It has been pointed out earlier in this chapter that in the twentieth century, copyright decisionmaking has involved contending interests groups gathered around different functions related to copyrighted works. The individual citizen, in general, has not been directly involved. Such decisionmaking, not involving the public directly but having an ultimate impact, has concerned some observers. The following statement of concern is by Victor Ferkiss in Technological Man: The Myth and the Reality:

> "The danger is not that industrialism has destroyed the intermediate group in modern democratic society but that the group is so strong that the individual, instead of finding freedom in the interstices created by group competition, may be crushed between the contending parties, or that instead of a dominant total government riding roughshod over an inert society, public purposes will be lost sight of in the feudalistic struggle of competing special interests."[79]

Professor David Truman considered the question raised above and concluded that "multiple memberships in potential groups based on widely held and accepted interests"[80] prevents the culmination of a situation such as that suggested by Ferkiss. That is, while groups may contend over specific property rights, the members of the groups share common fundamental views that prevent the erosion of individual rights that would have the effect of hurting everyone. Truman calls these shared attituded the "rules of the game" and quotes others as describing them as a "general ideological consensus" and as "a broad body of attitudes and understandings regarding the nature and limits of authority." As a further description, Truman states that "....the 'rules' would include the value generally attached to the dignity of the individual human being, loosely expressed in terms of 'fair dealing'...."[81]

For the purposes of proposing recommendations on computer-readable works, this study has enumerated in Section 1.3 those "Findings of Basic Principles" which it conceives to be the applicable "shared attitudes" and "rules of the game." As stated in Section 1.2, these findings are not be be taken as the final, definitive view. Other analyses may reveal different interpretations. Additional contributions to the literature are welcomed.

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APPENDIX A

IMPACT OF INFORMATION TECHNOLOGY ON COPYRIGHT LAW IN THE USE OF COMPUTERIZED SCIENTIFIC AND TECHNOLOGICAL INFORMATION SYSTEMS

A REPORT TO

THE NATIONAL BUREAU OF STANDARDS

(CONTRACT # T-35712)

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18 May 1977

ABSTRACT

The historical trends, methods, and observations of the courts, legislature and Copyright Office concerning the copyright law in relation to the development and introduction of technological processes and products during the twentieth century are analyzed. The rationale and underlying trends in the adaptation of copyright statutes to new technologies is shown by discussion of key cases.

Several suggested mechanisms are reviewed for providing technological expertise to the courts to enable them to respond to the complex technological issues that may arise in copyright litigation.

The impact of copyright law upon computerized Scientific and Technological Information Systems (STI) is discussed in the context of data bases and document storage and retrieval. The characteristics and conditions of the use of copyrighted material in computerized STI systems is presented. Blanket licensing, clearinghouses and compulsory licensing mechanisms that might be adapted for the use of copyrighted material in computer systems are reviewed.

KEY WORDS:

Copyright
Scientific and Technological Information Systems
Blanket Licensing of Copyrights
Compulsory Licenses
Clearinghouse for Copyright Licensing
Copyrightable Works
Data Bases
Full Text Storage of Documents
Computer Systems
New Technologies Relating to Copyright
Uses of Copyrighted Works

TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE
	ABSTRACT	A-2
A.1	EXECUTIVE SUMMARY	A-6
	A.1.1 BACKGROUND	A-6
	A.1.2 SCOPE OF THE STUDY	A-6
	A.1.3 MAJOR FINDINGS AND CONCLUSIONS	A-6
	A.1.3.1 Technological Innovation	A-6
	A.1.3.2 Major Historical Issues	A-7
	A.1.3.3 Conclusions Relating to Adaptation of Copyright Law to New Technologies	A-7
	A.1.3.4 Providing Technological Expertise to the Judiciary	A-10
	A.1.3.5 STI Systems and Copyright Law	A-11
	A.1.3.6 Groups Interested in STI Systems	A-11
	A.1.3.7 Orientation of Suppliers and Users of STI Systems	A-12
	A.1.3.8 Copyright Law and its Impact upon Computerized STI Systems	A-12
	A.1.3.8.1 Copyright Protection for Computer Programs	A-12
	A.1.3.8.2 Copyright Protection for Data Bases	A-13
	A.1.3.8.3 The Production of Data Bases	A-13
	A.1.3.8.4 The Use of Copyrighted Data Bases in Computerized Systems	A-13
	A.1.3.8.5 Exclusive and Compulsory Licenses for the Use of Data Bases	A-14
	A.1.3.8.6 Full Text Storage and Retrieval of Documents in Computerized Systems	A-15
	A.1.3.9 Unique Characteristics of Computerized STI Systems	A-15
	A.1.3.10 Clearinghouses and Compulsory Licenses	A-16
A.2	ADAPTATION OF THE COPYRIGHT LAW TO NEW TECHNOLOGIES	A-18
	A.2.1 IN GENERAL	A-18
	A.2.1.1 Philosophical Basis of Copyright	A-19
	A.2.2 MOTION PICTURES	A-20
	A.2.2.1 Copyrightability of Motion Pictures	A-20
	A.2.2.1.1 White Smith v. Apollo	A-22
	A.2.2.2 Motion Picture Version of Copyrighted Novel	A-23
	A.2.2.3 Performance Rights in Motion Pictures	A-23
	A.2.2.4 Sound Tracks as a Protected Part of Copyrighted Motion Picture	A-26

PAGE

A.2.2.5 Use of Music in Sound Tracks A-28
A.2.2.6 Motion Pictures Under the New Act of 1976. . . . . A-29
A.2.3 SOUND RECORDINGS A-30
A.2.3.1 Right to Record Copyrighted Works. A-30
A.2.3.1.1 Copyright Act of 1909. . . . . A-33
A.2.3.1.2 Copyright Act of 1976. . . . . A-34
A.2.3.2 Sound Recordings as Copyrightable Works. A-35
A.2.3.2.1 Congressional Legislation. A-38
A.2.4 RADIO AND TELEVISION BROADCASTS A-39
A.2.4.1 Broadcasting as Performance A-39
A.2.4.2 Reception of Broadcasts as Performance A-41
A.2.4.3 Wire Transmissions A-44
A.2.4.4 Copyright Act of 1976 . . . . . A-44
A.2.5 PHOTOCOPYING A-46
A.2.5.1 The Copyright Act of 1976. . . . . A-50
A.2.6 CABLE TELEVISION SYSTEMS A-53
A.2.6.1 The Copyright Act of 1976. . . . . A-58
A.2.7 MICROFILM, VIDEOTAPE, AND COMPUTER PROGRAMS. A-60

A.3 PROVIDING TECHNOLOGICAL EXPERTISE TO THE JUDICIARY A-62

A.4 THE COPYRIGHT LAW IN RELATION TO COMPUTERIZED INFORMATION SYSTEMS A-66

A.4.1 BACKGROUND A-66
A.4.1.1 Legislative History. A-66
A.4.1.2 Interested Groups. A-68
A.4.2 SCOPE OF THIS SECTION. A-69
A.4.2.1 Computer Programs. A-69
A.4.2.2 Data Bases A-69
A.4.2.3 Supplying Copyrighted Documents A-70
A.4.3 COPYRIGHT PROTECTION FOR COMPUTER PROGRAMS A-72
A.4.4 DATA BASE SYSTEMS. A-73
A.4.4.1 Copyright Protection for Data Bases A-73
A.4.4.1.1 Copyrightability A-73
A.4.4.1.2 Copyright Notice on Data Bases A-74
A.4.4.1.3 Deposit of Copies for Registration A-75
A.4.4.1.4 Supplements to Update Data Bases A-76
A.4.4.2 Compiling Data Bases A-76
A.4.4.2.1 Bibliographic Indexes A-76
A.4.4.2.2 Abstracts in Data Bases A-78
A.4.4.3 Putting Copyrighted Data Bases into Computer Systems A-79
A.4.4.3.1 Where Publishers Offer to Supply Machine Readable Copies. A-79
A.4.4.3.2 Where Publishers Do Not Offer Machine-Readable Copies. A-80

PAGE

A.4.4.3.3 Where Third Persons Offer to Supply Machine-Readable Copies A-81
A.4.4.3.4 Input of Data Base as Use Subject to Copyright A-82
A.4.4.4 Output from Data Base. A-83
A.4.4.4.1 Normal Output. A-83
A.4.4.4.2 Extraction of Bulk of Data Base by User of System A-85
A.4.4.5 Exclusive and Compulsory Licenses for the Use of Data Bases. A-86
A.4.5 FULL TEXT STORAGE AND RETRIEVAL OF DOCUMENTS A-87
A.4.5.1 Preliminary Observations A-87
A.4.5.2 Input and Output of Documents as Infringement A-88
A.4.5.3 Input or Output as Occasion for Obtaining License A-89
A.4.6 BLANKET LICENSING AND COMPULSORY LICENSING FOR REPRODUCTION OF DOCUMENTS. A-90
A.4.6.1 Need for Blanket Licensing Mechanism A-90
A.4.6.2 Voluntary Clearinghouse. A-92
A.4.6.2.1 ASCAP and BMI as Models A-92
A.4.6.2.2 Problem Areas A-94
A.4.6.3 Compulsory Licensing A-96
A.4.6.3.1 The Compulsory License for Jukeboxes A-97
A.4.6.3.2 The Compulsory License for CATV Systems. . . A-98
A.4.6.3.3 The Compulsory Licnese for Noncommercial Broadcasting A-99
A.4.6.4 Concluding Comments A-100

SUPPLEMENT 1 - STI TECHNOLOGY A-101

A.1 EXECUTIVE SUMMARY

A.1.1 BACKGROUND

The National Bureau of Standards (NBS) retained CRC SYSTEMS Incorporated, 125 Church Street, Suite 202, Vienna, Virginia 22180 to perform an analysis of the impact of information technology on copyright law in the use of computerized Scientific and Technological Information Systems (STI). The purpose of this report is twofold: First, to identify and describe the recent (1900-1970) impacts of technology upon copyright law and second, to present and discuss the potential impact of STI systems upon copyright law.

The accelerated pace of technological change and development during the twentieth century has required major adaptations and adjustments in the body of copyright law that was set forth in the statutes previously enacted. The courts have to a large degree been called upon to adapt the pre-existing copyright statutes by interpretation, to the issues arising from the later development of technologies. By reviewing the more significant decisions, this report attempts to develop for the reader an understanding of the underlying principles and philosophies of the copyright statutes and the court decisions applying to them. With this background and framework of the adaptation heretofore of the copyright law to new technologies, the authors focus upon the new computerized STI technology and the issues that this technology may bring to bear upon the body of copyright law in existence at the time of writing this report.

A.1.2 SCOPE OF THE STUDY

Although the history of copyright law in the United States dates from 1790, the rapid development of technology, especially electronic-based technologies, has occurred mainly after 1909. In that year the copyright law was rewritten, and it was not until recently (1976) that it was again rewritten. This report therefore will examine the changes, interpretations, and modifications to the 1909 law, and the ramifications of the new 1976 Copyright Laws, as they relate to technological changes. The scope of this report is bounded by issues that developed as a direct or indirect consequence of the introduction of new technologies.

A.1.3 MAJOR FINDINGS AND CONCLUSIONS

This section summarizes the major findings and conclusions of this report.

A.1.3.1 Technological Innovation. Among the more important innovations in information technology which have had important effects on the applicability, interpretation, and enforceability of copyright law in the twentieth century are:

- o Motion Pictures
- o Sound Recordings
- o Radio and Television Broadcasts
- o Photocopying
- o Cable Television Systems
- o Microfilm, Videotape, and Computer Programs

A.1.3.2 Major Historical Issues. Each of the above new technologies has resulted in adaptation of the copyright statutes to the new products and processes growing out of the new technologies developed after the statutes were enacted. With regard to the technologies examined in this report several basic questions arose which required judicial, legislative, or Copyright Office intervention. Among the more important issues raised were:

1. Is the new product copyrightable? (Motion pictures, sound recordings, microfilms, videotapes, computer programs.)

2. What rights are covered by the copyright in the new product? (Motion pictures, sound recordings, computer programs.)

3. Are new devices for using copyrighted works subject to the copyright? (Motion pictures, sound recordings, radio and television broadcasts, photocopying, cable television.)

These issues were dealt with and resolved principally by court decisions, of which the most significant are reviewed and analyzed in this report. Some relatively simple issues have been resolved as a practical matter by industry practice or by Copyright Office interpretation of the statute. The same issues have been dealt with finally in the new Copyright Act of 1976.

A.1.3.3 Conclusions Relating to Adaptation of Copyright Law to New Technologies. We believe the following observations and conclusions may be drawn from all of these sources concerning the adaptation of the copyright statutes to the new products and processes growing out of

new technologies developed after the statutes were enacted. These are not, of course, the only conclusions that might be drawn from the cases and events cited:

1. It seems certain that technologies now in their infancy or now unknown will, at some future time, result in new products or processes that will raise copyright questions not provided for specifically in the Copyright Act of 1976 (or the earlier statutes). The 1976 Act attempted to take into account recently developed technologies and their foreseeable applications affecting copyright. Even here the new Act did not succeed completely: As is shown in Section A.4 of this report, the problems concerning uses of copyrighted works in computer systems (which were discussed during the Congressional hearings in 1965 and 1967 on the copyright revision bills in the light of what was then known or anticipated as to such computer uses) were considered not sufficiently crystallized or understood to allow the formulation of legislative rules; instead, Congress provided (in P.L. 93-573 enacted in 1974) for the establishment of a National Commission (CONTU) to study these problems and make recommendations for appropriate legislation. And there will no doubt be other copyright problems raised hereafter by new technologies of the future that are completely unforeseen now.

2. Past experience indicates that the problems raised in the future by new technologies will be brought before the courts for decision as to how the terms of the 1976 Act are to be construed in their application to the new situations. The courts will be expected to make definitive rulings on many new issues involving such questions as the copyrightability of works produced in new ways or in new forms, and the rights of copyright owners and users with respect to uses made of copyrighted works by new methods or in new media.

3. The courts will probably differ among themselves in the basic approach they take to the application of the 1976 Act to the new situations. The decisions reviewed illustrate two main approaches:

(a) One is to expound the philosophy that the copyright law is intended to stimulate the creation and dissemination of works of authorship by giving to authors (and their successors as copyright owners) the economic rewards that are afforded by the market for the various uses that may be made of their works; the courts taking this approach have looked for analogies between the situations clearly provided for in the statute and the new situations, and, finding such analogies, have tended to hold that the new situation comes within the intended scope of the statutory provisions.

(b) The opposite approach has been to construe the statute narrowly as referring to the situations known at the time of its enactment; the courts starting with this premise have generally been concerned with the restrictions that copyright was seen to impose on socially beneficial new developments, if applied to them, and have considered that the extension of the statute to these new developments should be left to Congress.

The review of the court decisions in this study can be taken to indicate that, on the whole, the courts have been more inclined to take the first approach, particularly in the usual case where the issue appeared to be capable of satisfactory resolution by deciding simply whether the work or the use involved was or was not subject to copyright under the statute. The courts have taken the second approach when they were faced with a choice between holding for complete copyright liability or none, against an important new industry or use whose development or very existence was thought to be jeopardized if complete liability were imposed, and where legislation on the issue appeared imminent. (The majority opinions in the White-Smith case, in the Court of Claims decision in the Williams and Wilkins case, and in the Supreme Court decisions in the Fortnightly and Teleprompter cases illustrate the second approach; all the other decisions reviewed -- excluding some district court decisions that were reversed on appeal -- illustrate the first approach.)

4. Where the courts have held that the earlier copyright statutes extend to the products or uses resulting from new technologies developed later, Congress has generally adopted the same position in subsequent legislation. Where the courts have refused to extend the earlier statutes to new uses of copyrighted works because of the danger that imposing full copyright liability would result in unduly harmful consequences to the users or to the public. Congress has provided in subsequent legislation that such uses are to be brought under copyright, but subject to special exceptions or special conditions and limitations designed to forestall those harmful consequences, while giving copyright owners the measure of protection still possible or, at least, compensation for the new uses of their works.

5. Where a clear yes-or-no answer on a question of copyright protection or copyright liability will solve a problem raised by new technology, the problem can be, and is likely to be, resolved by judicial decisions construing the existing statutes. But where the problem is quite complex, with compelling economic or social interests on both sides to be safeguarded and reconciled, the slow and cumbersome process of legislation may be required to formulate a multifaceted set of basic rules

together with special conditions, limitations, exceptions, etc., peculiarly tailored to fit the differing needs of the several interest groups concerned. And it may be extremely difficult to enact legislation of this nature unless and until the interest groups are ready to agree or to accept the main features of the proposed legislation. (These observations regarding legislation are illustrated by the provisions in the 1976 Act on photocopying and on cable television.)

6. On some questions of how the existing statutes apply to the products of new technology, where the question is fairly uncomplicated and the justice of the answer given is fairly clear, a ruling by the Copyright Office or a practice adopted by an industry group may be sufficient to settle the question for all concerned.

A.1.3.4 Providing Technological Expertise to the Judiciary. When courts have needed to be informed concerning matters of esoteric technology, they have generally been provided with the technological expertise pertinent to the issues in the case before them through such established procedures as the testimony of expert witnesses, physical demonstrations of technical devices or processes, briefs or memoranda presented by counsel, and research conducted by the court or its aides. Those procedures have apparently been found adequate in most litigation, including the usual run of copyright cases.

If other means were considered to be necessary, in extraordinary cases, to provide technological expertise to the judiciary, several other mechanisms might be given consideration:

1. The establishment of a special court or system of courts to deal with cases involving highly complex and sophisticated technological issues. Prototypes of such courts now exist in the Court of Customs and Patent Appeals, the United States Tax Court, and the special State courts established to deal with juvenile and domestic relations cases.

2. Having specialists in the fields of science or technology involved attached to the staff of the court or available to serve as consultants to the court. Many of the juvenile and domestic relations courts now employ specialists in the medical, behavioral, and social sciences as staff members or consultants.

3. Making available to the courts the expertise of the wide range of scientific and technological specialists employed by the various Government agencies.

We do not believe any such special mechanisms are needed in copyright litigation involving new technologies. The judicial decisions in copyright cases dealing with new technologies -- as exemplified by those reviewed in this study -- indicate that the courts have been adequately informed, through the judicial procedures now used, concerning the new technologies involved, to reach intelligent and appropriate judgments.

A.1.3.5 STI Systems and Copyright Law. The authors, after reviewing the general principles that the courts have applied to copyright issues, and the historical impact of new technologies upon the copyright statutes, examined computerized STI systems in relation to the copyright law.

A.1.3.6 Groups Interested in STI Systems. The interest groups having, primarily and most directly, a financial, professional or service interest in the copyright issues relating to the generation, dissemination, or use of STI systems include:

- Authors of various kinds of works, principally textual and graphic works in the field of science and technology.
- Commercial and nonprofit publishers of journals and of books and monographs of a scholarly or informational character.
- Producers and publishers of compilations of bibliographic and factual data.
- Libraries, especially large research, university, and industrial libraries.
- Educators and students, especially at the college and university levels.
- Industrial and nonprofit research organizations and individual researchers.
- Producers of computer hardware and software.
- Organizers and operators of computerized information service systems.
- Commercial indexing and data search services.

These groupings could, of course, be arranged in other ways, and there is considerable overlap among the groups as listed above.

A.1.3.7 Orientation of Suppliers and Users of STI Systems. From the standpoint of their copyright interests, the various groups may be divided into two broad categories: (1) authors, producers, publishers, and other suppliers of copyrightable materials, who are interested in having copyright protection and in receiving compensation for the uses of their works; and (2) researchers, educators, scholars, libraries, and other users of copyrightable materials, who are interested in having access to and use of those materials.

The differing needs of copyright owners on one hand and users of copyrighted materials on the other hand, are usually met by contracts negotiated in the open market. The desire of copyright willingness of owners to derive revenue from the market for their works, and the willingness of users to pay reasonable fees for the use of those works, have generally operated to make the market place responsive to the needs on both sides. In most situations the system of freely negotiated contracts should work to meet the needs of the owners and users of copyrighted works used in computerized STI systems.

In certain situations involving the use of copyrighted works in other media, problems of accommodating the needs of both owners and users have called for special treatment, either through voluntary systems for centralized or blanket licensing or through statutory provisions for compulsory licensing. These special methods of accommodation are discussed in the report as outlined below.

A.1.3.8 Copyright Law and its Impact upon Computerized STI Systems. Among the conclusions reached in this study concerning the application of the copyright law to computerized STI systems are the following:

A.1.3.8.1 Copyright Protection for Computer Programs. Computer programs generally are subject to copyright protection. The protection afforded by copyright is limited to reproduction of the program in its substance. Copyright would not protect the processes or techniques revealed in the program.

A.1.3.8.2 Copyright Protection for Data Bases.

1. In general, data bases, whether in printed or machine-readable form, are copyrightable as compilations.

2. Complying with the requirements of copyright notice and deposit of copies, as may be necessary for effective copyright protection, may call for some special procedure in the case of data bases in machine-readable form, and in the printout of material from data bases, but no insuperable difficulties in this regard are seen.

A.1.3.8.3 The Production of Data Bases.

1. The indexing of documents in order to compile a bibliographic data base can be done manually or by using a computer. If done by computer, the indexer must have the documents in machine-readable form. If the documents are copyrighted, the indexer would apparently have to obtain machine-readable copies from the publishers, or to obtain permission from the publishers to make and use his own machine-readable copies, for indexing. It has been argued that where the publishers cannot supply machine-readable copies, an indexer should be permitted by law to make his own, for the sole purpose of indexing, as a fair use or, alternatively, under a compulsory license.

2. The typical abstracts in data bases are no more than brief identifying statements of the subjects covered in the document; making such abstracts of copyrighted works is not an infringement. However, a so-called "abstract" that is actually a digest of the substance of a copyrighted work, sufficient in detail to substitute for the work itself, would constitute a derivative work, and making such would infringe the copyright.

A.1.3.8.4 The Use of Copyrighted Data Bases in Computerized Systems.

1. Where a system operator obtains a machine-readable data base from the publisher, the lease agreement between them will generally include (expressly or impliedly) a license for the operator's use of the data base in his system. Such agreements will usually serve to settle the copyright questions that would otherwise be expected to arise. Where the publisher offers machine-readable copies, a system operator who makes his own copy instead of obtaining one from the publisher should be considered an infringer.

2. Where the publisher of a copyrighted compilation of data does not offer machine-readable copies, an operator who wishes to place that compilation in his data base system should be expected to ask the publisher to make and supply a machine-readable copy or to permit the operator to make one for use in his system. Where the publisher then refuses or fails to accede to such request, a valid argument could be made for a compulsory license.

3. It can be assumed that the publishers of machine-readable copies of copyrighted compilations of data will generally lease them, but not sell them, to system operators. An operator who is offered such a copy from a third person should therefore be suspicious of its legitimacy, and should be held liable if he acquires such a copy that was made or supplied to him in violation of the copyright.

4. If a system operator makes his own machine-readable copy of a copyrighted compilation or acquires a copy legitimately from a third person, he will need to obtain a license from the publisher to use it in his system. There are good arguments for requiring the operator in this situation to obtain such a license before putting the data into his system.

5. If a license for the use of a copyrighted data base in a system has not been obtained earlier, the operator would need to obtain a license for the output of material from the data base. In the absence of a license, the extraction of a small fragment of a data base by a user of the system on one occasion would appear to qualify as a fair use; but the aggregate of the output of fragments on many occasions would appear to constitute an infringement by the operator of the system.

6. If a user of a system were to extract from it an entire copyrighted data base or a major part of it, he would be infringing the copyright. Practical arrangements for preventing and detecting such infringements seem feasible.

A.1.3.8.5 Exclusive and Compulsory Licenses for the Use of Data Bases. In order to facilitate the development of computerized systems that will contain all the data bases needed for comprehensive coverage of any subject area, and also to prevent the monopolization of data base search services by one or two systems, consideration should be given to a scheme for precluding exclusive licenses for the use of data

bases in individual systems. One such scheme would be a statutory provision for the compulsory licensing for use in all systems, of a data base licensed for use in any one system.

A.1.3.8.6 Full-Text Storage and Retrieval of Documents in Computerized Systems.

1. The questions as to input and output of copyrighted documents are substantially the same as those pertaining to the input and output of copyrighted data bases. The discussion and conclusions in this study relating to data bases are applicable generally to the computer storage and retrieval of the full text of documents.

2. There has been considerable discussion as to whether the input of copyrighted documents should be free, with a license and payment to the copyright owner being required for output, or whether a license should be required before input. The arguments advanced on both sides are presented in this report. The authors of this report are impressed most by the argument that, since a license will admittedly be required for output, practical considerations suggest that the terms of the license, including the basis for assessing fees, should be settled between the parties before the operator of the computer system begins the process of using the material.

A.1.3.9 Unique Characteristics of Computerized STI Systems. It can be deduced from the analysis of copyright questions relating to the use of copyrighted works in computer systems that such uses present special characteristics not present in the traditional ways of using copyrighted material. The following special features of computer uses seem particularly significant:

1. Copyrighted works in their usual form of printed pages are usable in that form in other media, but must be converted to machine-readable form for use in computer systems.

2. The availability to researchers and other users of the works placed in a computerized STI system will tend to displace the market that would otherwise exist for the sale of copies of the works to them.

3. Computerized STI systems, to realize their potential value for research, must seek to include comprehensively the whole body of works extant in any particular field of science or technology.

4. Exclusive licensing of copyrighted works for use in one STI system could have two undesirable results: (1) It would prevent other systems from attaining comprehensive coverage of the whole body of works in a particular field, thus putting researchers to the inconvenience of searching through several systems; and (2) It would tend to foster the monopolization of STI system services to one or two giant systems.

The first two of these special features would seem to indicate that the copyright law should recognize, as it now appears to do, that the conversion of copyrighted works into machine-readable form and their input and output in the operation of computerized STI systems require the consent of the copyright owner. The last two of these special features would seem to indicate that there may be a need to establish, at least in some situations, either voluntary "clearinghouse" systems for the blanket licensing, on a nonexclusive basis, of the use of copyrighted works in computer systems, or a statutory system of compulsory licensing for the use of such works in those systems.

A.1.3.10 Clearinghouses and Compulsory Licenses. The clearinghouses operated by the American Society of Composers, Authors, and Publishers (ASCAP) and by Broadcast Music, Inc. (BMI) for the blanket licensing of public performances of musical compositions, have frequently been cited as possible models that might be adaptable for the blanket licensing of reproduction rights in journal articles and other works. The operation of these two organizations and the factors that have contributed most importantly to their effectiveness are outlined in this report. Some of the major problems that would be faced in attempting to establish a clearinghouse for the reproduction of journal articles are mentioned and some approaches for meeting those problems are suggested in the report.

Provisions for a compulsory license for the recording of copyrighted musical compositions were enacted in the Copyright Act of 1909. That compulsory license was designed to prevent the establishment of a monopoly in making recordings of music under exclusive licenses that would otherwise have been granted. One of the practical consequences of these compulsory licensing provisions, incidentally, has been the voluntary establishment by music publishers of a centralized agency (the Harry Fox Office) for the issuing of negotiated licenses on standard terms for the music of most of the major publishers.

The Copyright Act of 1976 provides for compulsory licenses of a different character in three additional situations: for the performance of music in jukeboxes, for CATV retransmissions of broadcasts of copyrighted material, and for the use of certain works in noncommercial broadcasting. These three compulsory licensing systems are examples of blanket, non-exclusive licensing established by statute. The purpose of the compulsory license in these three instances is not to prevent a monopoly, but is to avoid the difficulties and high transaction costs that would be entailed if the user groups had to obtain licenses from and pay fees to the individual copyright owners.

If a voluntary clearinghouse satisfactory to both copyright owners and users can be organized, that would seem to be preferable over a statutory compulsory licensing scheme. Among other reasons mentioned for this preference, perhaps the most important is the greater flexibility of a voluntary arrangement and its easier accommodation, by negotiations between the groups concerned, to experience and changing circumstances.

A.2 ADAPTATION OF THE COPYRIGHT LAW TO NEW TECHNOLOGIES

A.2.1 IN GENERAL

Since the enactment of the first United States copyright statute by the First Congress in 1790, the copyright law has had to be added to, modified, revised, and interpreted to meet changing conditions brought about in large part by new technological developments. The statutes were completely rewritten in 1831, 1870, 1909, and just recently, in 1976. In the intervals between those comprehensive revisions, the statutes were amended in some particulars, and they were further adapted to changing conditions by judicial interpretation and, to some extent, by business practice.

Adaptation of the copyright law to changing conditions brought about by new technology has been especially necessary in the twentieth century, primarily for the obvious reason that the rate of technological development has accelerated rapidly. And, because of the long interval of more than 65 years from the 1909 revision, with the statute being amended during that period in only relatively minor respects, the courts have been called upon to take a large part in adapting the law, by interpretation, to meet the problems emanating from the new technologies.

An analysis of the more significant court decisions dealing with those problems, particularly as the decisions reveal the basic principles and philosophical approaches adopted by the courts in construing the copyright statues, may contribute to an understanding of how the copyright law has been shaped and reshaped to fit new conditions flowing from technological innovations, and may be useful in indicating approaches to the solution of similar problems that may be raised by the newer and emerging technologies of today and the foreseeable future.

In this section we shall seek to show how the copyright law has been adapted to resolve the questions raised by the new technologies of the twentieth century that were not dealt with specifically in the statutes because they were just beginning to emerge or were unknown when the statutes were enacted. Among these new technologies are:

- -- motion pictures, silent and with accompanying sound;
- -- sound recordings and sound reproducing mechanisms;
- -- radio and television transmission and reception;
- -- rapid, effecient copying machines;
- -- cable television systems;
- -- microfilm, videotapes, and computer programs.

We shall review principally the adaptations of the copyright law in court decisions, but some attention will also be given, in passing, to industry practice and to the regulations and practices of the Copyright Office. In addition, we shall summarize the adaptation to the several new technologies reflected in the copyright law revision enacted in 1976.

A.2.1.1 Philosophical Basis of Copyright. To understand how the copyright law has developed and has been adapted to meet new issues, it is important to keep in mind the fundamental philosophy underlying copyright. The basis of copyright is stated in broad terms in the clause of the United States Constitution empowering Congress --

> "To Promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."

We deduce from the Constitution that the end purpose of copyright is to "promote the progress of science and useful arts," that is, to stimulate the growth and spread of learning and culture for the benefit of society at large; and that, as a means toward achieving this end, authors are to be given exclusive rights in their works; thus, the creation and public dissemination of works of authorship are to be fostered by giving to authors the legal means to realize the economic value of their contributions to society.

The United States Supreme Court has expressed the underlying purpose of copyright as follows:

> "The primary object in conferring the monopoly (of copyright) lie(s) in the general benefits derived by the public from the labors of authors. A copyright, like a patent, is 'at once the equivalent given by the public for benefits bestowed by the genius and meditations and skill of individuals, and the incentive to further efforts for the same important objects.'" (Fox Film Corporation v. Doyal, 286 U.S. 123, 1932)

> "The economic philosophy behind the clause empowering Congress to grant patents and copyrights is the conviction that encouragement of individual effort by personal gain is the best way to advance public welfare through the talents of authors and inventors in 'Science and Useful Arts'. Sacrificial days devoted to such creative activities deserve rewards, commensurate with the services rendered." (Mazer v. Stein, 347 U.S. 201, 219, 1954)

We move on now to a review of how the courts have dealt with the issues raised by the new technologies for which the statutes then in effect made no specific provisions.

A.2.2 MOTION PICTURES

Motion pictures have been a prime example of a new technology raising questions, as to the application of the copyright law, that the statutes currently in effect did not deal with specifically. The courts were called upon to resolve these questions in various situations involving (1) the status of motion pictures as copyrightable subject-matter, (2) the use of copyrighted literary and musical works in motion pictures, (3) the rights embraced in the copyright in motion pictures, and (4) the copyright status of motion picture sound tracks.

A.2.2.1 Copyrightability of Motion Pictures. The question of whether motion pictures could be copyrighted arose at the beginning of the twentieth century when the motion picture art was in its infancy. The pertinent statute then in effect (Section 4952 of the Revised Statutes) had been enacted (in 1870) when motion pictures were unknown. The statute did specify, among the categories of copyrightable works, "any photograph or negative thereof." In the case of Edison v. Lubin, decided in 1903, the maker of a series of 4500 photographs which together were to be projected through a machine to show, as a moving picture, the launching of Kaiser Wilhelm's yacht, asserted copyright in the series of pictures as a single "photograph" under the statute. In the District Court (E.D. Pa., 119 F. 993), it was held that the statute did not extend to "an aggregate of photographs," but that each individual photograph would have to be registered separately and to bear the prescribed notice of copyright in order to be protected. On appeal the Circuit Court reversed, holding that the series of photographs, which were all on one continuous strip of film, was copyrightable as one "photograph" within the statute (3d Cir. 122 F. 240).

The differing opinions of the District and Circuit Courts in this case are illustrative of two opposite judicial approaches to the application of the terms of the copyright statute to a later technological innovation. The District Court said:

> "It may be true, as has been argued, that this construction of the section renders it unavailable for the protection of such a series of photographs as this; but if, for this reason, the law is defective, it should be altered by Congress, not strained by the courts. I understand that when this act was passed these groups of consecutive photographs were practically speaking, not in existence; and, in the absence of any

expression of the will of Congress which can be applied to them, I am not at liberty to conjecture what further provision, if any, would have been made, if their creation had been foreseen."

In contrast, as the Circuit Court of Appeals saw it:

> "The negative and its positive reproduction represent one act or event, to wit, the launch of the yacht...To say that the continuous method by which this negative was secured was unknown when the act was passed, and therefore a photograph of it was not covered by the act, is to beg the question. Such construction is at variance with the object of the act, which was passed to further the constitutional grant of power "to promote the progress of science and useful arts". When Congress, in recognition of the photographic art, saw fit... to extend copyright protection to a photograph or negative, it is not to be presumed it thought such art could not progress, and that no protection was to be afforded such progress. It must have recognized there would be change and advance in making photographs, just as there has been in making books, printing chromos, and other subjects of copyright protection. While such advance has resulted in a different type of photograph, yet it is none the less a photograph--a picture produced by photographic process...And that it is, in substance, a single photograph is shown by the fact that its value consists in its protection as a whole or unit, and the injury to copyright protection consists not in pirating one picture, but in appropriating it in its entirety."

That the Circuit Court was eager to apply the act so as to protect the motion picture is further shown by its additional comment:

> "We are further of opinion the photograph in question met the statutory requirement of being intended to be perfected and completed as a work of the fine arts. It embodies artistic conception and expression. To obtain it requires a study of lights, shadows, general surroundings, and a vantage point adapted to securing the entire effect...We have no question that the present photograph sufficiently fulfills the character of a work of the fine arts."

In sum, the District Court opinion reflects the approach of giving the terms of the statute the application they had when enacted, with reluctance to extend those terms to subsequent technological innovations; while the Circuit Court opinion shows the tendency to construe the terms of the act in the light of the basic purpose of copyright to protect

works of authorship and, in that light, to extend the act to new technological developments that can be analogized to objects specified in the act.

The holding by the Circuit Court of Appeals in Edison v. Lubin was followed and carried a step further in American Mutoscope & Biograph Co. v. Edison Mfg. Co., 137 F. 262 (D.N.J. 1905). The Lubin decision had equated the motion picture of a single, continuous event -- made at one time and place using a pivoted camera -- with a "photograph"; in American Mutoscope the motion picture consisted of several sequences of pictures taken at different times and places so that, when shown as a continuous series, they told a story. Said the court in American Mutoscope:

> "I am unable to see why, if a series of pictures of a moving object taken by a pivoted camera (as in the Lubin case) may be copyrighted as a photograph, a series of pictures telling a single story ..., even though the camera be placed at different points, may not also be copyrighted as a photograph. Though taken at different points, the pictures express the author's ideas and conceptions embodied in the one story. In that story, it is true, there are different scenes. But no one has ever suggested that a story told in written words may not be copyrighted merely because, in unfolding its incidents, the reader is carried from one scene to another."

Here again, the court finds its way to protection of a work of authorship in a new technological medium by analogizing that medium with an older one specifically provided for in the statute.

A.2.2.1.1 White-Smith v. Apollo. We digress briefly from the motion picture cases to mention, in its chronological order, the ruling of the U.S. Supreme Court in 1908 in the celebrated case of White-Smith Music Publishing Co., v. Apollo Co., 209 U.S. 1, on the question of whether the making of sound recordings (piano rolls in this case) by which music could be played, infringed the copyright in the music. The court held that the exclusive right to copy the music was not infringed because "copy" was understood to denote a visual reproduction of the written musical score. This ruling that visual perceptibility was an essential element of a "copy" was to be cited profusely thereafter in various contexts including some of the motion picture issues. We shall examine the White-Smith decision more fully in the later discussion of cases dealing with sound recordings as a new technology.

A.2.2.2 Motion Picture Version of Copyrighted Novel. Whether a motion picture telling, in pictorial pantomime, portions of the story of the novel "Ben Hur" infringed the copyright in that novel, was the question raised in Harper & Bros. v. Kalem Co., before the Second Circuit Court of Appeals (169 F. 61) in 1909 under the older statute. The court felt constrained first, by the Supreme Court ruling in White-Smith v. Apollo, to hold that the motion picture was not a copy of the novel since it did not reproduce the language of the novel; but it got around the White-Smith doctrine by finding that the right of an author to dramatize his work, which the statute provided for in general terms, had been infringed by exhibiting the motion picture. It reached this result by equating the exhibition of the motion picture with a stage presentation:

> "It can hardly be doubted that, if the story were acted without dialogue, the performance would be a dramatization of the book; and we think that, if the motions of the actors and animals were reproduced by moving pictures, this would be only another form of dramatization."

The Supreme Court, reviewing the case in 1911 (222 U.S. 55), agreed with this view. In his opinion Justice Holmes said:

> "Whether we consider the purpose of this clause of the statute (giving authors the exclusive right to dramatize their works) or the etymological history and present use of language, drama may be achieved by action as well as by speech. Action can tell a story, display all the most vivid relations between men, and depict every kind of human emotion without the aid of a word. It would be impossible to deny the title of drama to pantomime as played by masters of the art...But if a pantomime of Ben Hur would be a dramatizing of Ben Hur, it would be nonetheless so that it was exhibited to the audience by reflection from a glass...The essence of the matter...is not the mechanism employed but that we see the event or story lived."

Thus, the Circuit and Supreme Courts here took the view that the use of a new medium to present a version of a copyright work was not an essential factor, but that the use of the work with the effect that copyright was designed to cover was determinative.

A.2.2.3 Performance Rights in Motion Pictures. When the copyright law was revised in 1909, no mention was made of motion pictures, although they were well known by that time as shown by the cases reviewed above. This omission was rectified by amendments enacted in 1912 (37 Stat. 488), which added to the categories of copyrightable works listed in Section 5

of the statute,"Motion-picture photoplays" and "Motion pictures other than photoplays." Strangely enough, however, the 1912 amendments made no corresponding change in the specifications, in Section 1 of the 1909 act, of the rights embraced in copyright, thus leaving the situation this way: The right to make and publish copies was provided for in the 1909 statute as being applicable to all categories of works, and was therefore applicable to motion pictures after the amendments of 1912; but the right of public performance was provided for as being applicable specifically to dramatic and musical works. So it was that the courts were called upon to determine whether unauthorized performances ("exhibitions") of copyrighted motion pictures infringed the copyright under the 1909 statute.

This question was presented in Tiffany Productions v. Dewing, 50 F. 2d 911 (D. Md. 1931) with respect to exhibitions of a motion picture by a licensed exhibitor beyond the times and places specified in the license. On the basis of the Supreme Court decision in White-Smith v. Apollo, the court here held that exhibiting a motion picture was not the making of a "copy." The court was doubtful as to whether exhibiting a motion picture might be an infringing "publication" of it: The court said the White-Smith decision indicated a negative answer, but that the generally recognized meaning of "publication" would seem to warrant a contrary conclusion. The approach of the court to adapting the terms of the statute to a new situation not specifically provided for is shown by its following observation:

> "As a practical matter, the value of the copyright consists in the monopolistic right to project and exhibit the picture itself from each and every film as well as the right to exclude others from duplicating the film. Protection merely of the latter right may be entirely ineffectual to accomplish the desired end. The statute must be given a sensible meaning in its application to modern invention, expressly within the scope of the statute."

The court then went on to hold that a motion picture photoplay is a form of "dramatic work" even though the two are mentioned as separate classes of works in section 5 of the act, so that the exclusive right provided in section 1 to "publicly perform" a dramatic work applies to the public exhibition of a motion picture photoplay.

Concurrently with the Tiffany Productions case, the same question -- whether the copyright in a motion picture was infringed by its exhibition beyond those specified in a license -- was considered also in Metro-Goldwyn-Mayer v. Bijou Theatre, 50 F. 2nd 908 (D. Mass. 1931), where the District Court reached the opposite result. The court here rejected the premise that a photoplay is a "dramatic work" within the

scope of the statutory provision granting a performance right for dramatic works. The court took the narrow view that when this latter provision was enacted,

> "Nobody then thought of 'drama' or 'dramatic work' in terms of motion pictures. A moving-picture play is utterly different from anything then conceivable -- an entirely new method of communicating ideas."

The court then observed that:

> "As a general rule, the effect of a new invention in any given field seems to be a matter for legislative consideration, rather than for the extension of existing statutes by judicial construction."

On appeal, the District Court ruling in the Bijou Theatre case was set aside by the Circuit Court of Appeals (59 F. 2d 70, 1st Cir. 1932), which adopted the view of the court in the Tiffany decision. The Circuit Court stated its approach in seeking to find the intention of Congress as follows:

> "The copyright statutes ought to be reasonably construed with a view to effecting the purposes intended by Congress. They ought not to be unduly extended by judicial construction to include privileges not intended to be conferred, nor so narrowly construed as to deprive those entitled to their benefit of the right Congress intended to grant."

Leaning on court decisions (notably Buck v. Jewell-La Salle, 283 U.S. 191 (1931), to be discussed below) holding that radio transmission and reception were within the statutory provisions as to public performance of music, the Circuit Court commented:

> "No sound reason appears why publication through the sense of hearing is more damaging than publication through the sense of sight. If inhibition is applicable to the former, it should also apply to the latter. There appears to be an increasing tendency to liberalize the construction of copyright statutes to meet new conditions which have rapidly developed within the last decade and which are continuing to develop, perhaps most strikingly illustrated by the application of radio broadcasting to copyright."

On remand of M.G.M. v. Bijou Theatre, 3 F. Supp. 66 (D. Mass. 1933) (remanded for determination that the motion picture involved was a "photoplay")

the District Court followed the Circuit Court opinion in holding that the unauthorized exhibition of the photoplay infringed the right to perform it as a species of dramatic work. It said further that if the motion picture were considered non-dramatic, its exhibition would infringe the right specified in the statute to dramatize a non-dramatic work.

The Tiffany Productions and Bijou Theatre decisions may be seen as indicating the view that the economic benefits of copyright were intended to be accorded for uses of copyrighted works in connection with new technological processes, even though such uses through those processes were not expressly provided for in the statute, as long as similar uses through previously known processes were within the terms of the statute.

A.2.2.4 Sound Tracks as a Protected Part of Copyrighted Motion Picture. A whole new set of questions was raised by the advent of "talking pictures" near the end of the 1920s. One such question was presented in the case of L.C. Page & Co.v. Fox Film Corp., 83 F. 2d 196 (2d Cir. 1936) where the author of a copyrighted novel licensed the plaintiff to exercise "the exclusive moving-picture rights" in the novel; this license was granted in 1923 when "talking pictures" were not yet known commercially. One of the issues in the case was whether this license gave the plaintiff the exclusive right to make talking pictures when they were later developed. The court held that the license did cover talking pictures:

> "We can entertain no doubt that the words used, "the exclusive moving picture rights," were sufficient to embrace not only motion pictures of the sort then known but also such technical improvements in motion pictures as might be developed... The development of mechanisms making it possible to accompany the screen picture with the sound of spoken words was but an improvement in the motion picture art. As the plaintiff well says, 'talkies' are but a species of the genus motion pictures."

A more fundamental question raised by the development of sound tracks was whether the sound track and its literary or musical content are protected by the copyright in the motion picture. There appear to be no judicial rulings on this precise question. In practice the industry groups concerned tacitly accepted and operated on the premise that the sound track is protected as an integral part of the motion picture; and this premise appears to be logically valid since the pictures and sound together are necessary to constitute the complete work and to convey its artistic effect.

As some commentators have pointed out,* there was room for doubt as to whether the copyright in a motion picture protected its sound track, since sound tracks might be equated with phonograph recordings which (before the enactment in 1971 of the statutory amendment to be referred to presently) were not copyrightable. Because of this doubt, the Copyright Office, until 1975, stated in its Compendium of Copyright Office Practices (section 2.14.1, III):

> "a. The Copyright Office takes no position as to whether copyright in a motion picture covers the integrated sound track portions of the work.
>
> b. Registration is not made for a sound track alone, or for a sound track as the only new matter in a previously published or registered motion picture."

On October 15, 1971, the copyright law was amended by Public Law 92-140 to extend copyright protection for the first time to "sound recordings" which were defined as "not including the sounds accompanying a motion picture." The House Report (No. 92-487) on this amendment explained:

> "In excluding 'the sounds accompanying a motion picture' from the scope of this legislation, the Committee does not intend to limit or otherwise alter the rights that exist currently in such works. The exclusion reflects the Committee's opinion that sound tracks or audio tracks are an integral part of the 'motion pictures' already accorded protection ... and that the reproduction of the sound accompanying a copyright motion picture is an infringement of copyright in the motion picture."

This amendment and the pronouncement in the Congressional Report served to remove the doubt about the protection of the sound track under the copyright in the motion picture. On March 19, 1975, the Copyright Office amended its regulations to state:

> "For purposes of deposit and registration only, any copyrightable component part of a motion picture sound track (e.g., a musical composition) is considered an integral part of a motion picture. Registration of any copyrightable component part of a motion picture sound track may be made by registration of the motion picture..."

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* For example, NIMMER ON COPYRIGHT, sec. 25(2).

The foregoing history of how the statutory provision for the copyright protection of motion pictures was adapted to the later development of sound tracks as an adjunct to the pictures illustrates another process of adaptation to new technology. Here, while there was a court decision (in the Page case) that hinted indirectly at the inclusion of the sound track as part of the protected motion picture, there was no clear ruling on the question for many years during which a practical adaptation was made by the industry groups concerned; and ultimately the premise of that practical adaptation was confirmed by a Congressional pronouncement and by the adoption of a corresponding interpretation of the law in the regulations of the Copyright Office concerning its registration practices.

A.2.2.5 Use of Music in Sound Tracks. Shortly after the White-Smith decision in 1908, Congress enacted a general revision of the copyright law in 1909. Section 1 of the revised law incorporated, among the exclusive rights embraced in copyright, the new right to make any "record" of a literary, dramatic, or musical work from which the work may be "reproduced." In the case of music under section 1(e), this right with respect to "the parts of instruments serving to reproduct mechanically the musical work" was made subject to a compulsory license; that is, whenever the copyright owner permitted the use of his music in a mechanical recording, anyone else could make a similar recording of the music upon payment of a royalty of 2 cents per record.

In Jerome v. Twentieth Century-Fox Film Corp., 67 F. Supp. 736 (SDNY) decided in 1946, the defendant motion picture producer contended that the compulsory license provisions for the mechanical recording of music should be applied to the recording of music on motion picture sound tracks. The court rejected this contention, saying:

> "When (the compulsory license provisions) went into effect as part of the March 4, 1909 revision of the Copyright Act, sound on film motion pictures was unknown. 'Talkies' so-called, were not produced until about 1924. The report of the 1909 Copyright Bill to the House of Representatives (Report No. 2222) discusses Section 1(e) and mentions the various types of mechanical reproductions such as phonographs and piano-playing instruments, 'purely mechanical' means. Counsel assert that no more than 500 positive prints of a film of a musical motion picture are made to supply the demands for exhibition purpos[illegible] If Section 1(e) applied to a motion picture use of a mu[illegible] composition, then any producer could appropriate a copyrighted musical composition for use in a motion picture for a total sum of about $10.00, at the rate of 2 cents for each positive print.

"'Talkies' are but a species of the genus motion pictures."... The sound on film parallels and synchronizes with the pictures on the film. The sound on film is not the type of 'mechanical reproduction' to which Section 1(e) of the Copyright Act applies...

"The Copyright Act permits the copyright of a motion picture...; but a music roll or victrola record cannot be copyrighted... It was not intended that motion picture films should be in the same class as mechanical reproductions... To give to the defendant's contention any recognition would be to run counter to the clear intent of Congress. The result would be destructive of valuable rights of composers and publishers, which the Act was intended to secure and protect."

This decision may be seen as a counterpart of, and consistent with, those reviewed above which extended the terms of the statute to include motion pictures and their sound tracks so as to provide the benefits of copyright to the creators of motion pictures and to the creators of works used in motion pictures. In the Jerome case, extension of the compulsory license to the recording of music in motion picture sound tracks would have cut back sharply on the benefits enjoyed by the copyright owners of music; motion pictures producers would have paid almost nothing for the highly valuable privilege of using copyrighted music in their films. So, the statute was construed to preserve the benefits of copyright for the creators of music.

A.2.2.6 Motion Pictures Under the New Act of 1976. The general revision of the copyright law, P.L. 94-533, enacted on October 19, 1976, confirmed and embodied in the statute the rulings outlined above by which the earlier statutes had been adapted to the subsequently developed motion picture technology. Thus, under the new statute:

-- "Motion pictures" are listed among the categories of protected works (sec. 102 (a)), and that term is defined (in sec. 101) as including "accompanying sounds, if any."

-- As for the use of other works, such as literary or dramatic works, in motion pictures, the exclusive rights in the various categories of protected works include the right "to prepare derivative works based upon the copyrighted work" (sec. 106), and a "derivative work" is defined (in sec. 101) as including a "motion picture version" of any preexisting work.

-- The copyright in a motion picture embraces specifically the right to "perform" it "publicly" (sec. 106), and to

"perform" a work is defined (in sec. 101) as meaning, "in the case of a motion picture ... to show its images in any sequence or to make the sounds accompanying it audible."

-- The exclusive right "to reproduce the copyrighted work in copies" (sec. 106) includes the recording of a musical or other work in a motion picture sound track, since "copies" are defined (in sec. 101) as "material objects in which a work is fixed by any method now known or later developed, and from which the work can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device."*

-- The compulsory license for the recording of music is confined to the making of "phonorecords" (sec. 115), and that term is defined as excluding the sounds "accompanying a motion picture."

So it is that the adaptation of the 1909 and earlier statutes to motion pictures is completed by the new copyright law of 1976.

A.2.3 SOUND RECORDINGS

A.2.3.1 Right to Record Copyrighted Works. Devices for the recording and playing back of music and other sounds were developed late in the 19th century, and during the first few years of the 20th century the manufacture and sale of such recordings in the form of both phonograph records and piano rolls grew to a business of substantial volume. The copyright owners of music sought to subject the recording of their music in these new devices to their copyrights by instituting infringement suits, and by proposing, in the movement begun in 1905 to revise the copyright statutes, that the law be amended to accord them a new exclusive right to make recordings of their copyrighted works.

The most important of the infringement suits was the famous case of White-Smith Music Publishing Co. v. Apollo Co., 209 U.S. 1, decided by the Supreme Court in 1908, to which reference has been made above. The question at issue was whether perforated music rolls, by which copyrighted musical works could be played mechanically on player pianos,

* This definition of "copies" overturns the holding in the White-Smith decision. And note how it seeks to anticipate future technologies for recording and reproducing images and sounds.

infringed the copyright owner's exclusive right of "copying" his music under the statute enacted in 1870. Holding that the piano roll was not a "copy" of the musical work within the meaning of the statute, the Supreme Court first referred to the earlier decisions of two lower courts and of an English court so holding, and pointed out that Congress had since amended the copyright law (in other respects) when it must have known of those decisions; from that the Supreme Court reasoned that "the omission of Congress to specifically legislate concerning (sound recordings) might well be taken to be an acquiescence in the judicial construction given to the copyright laws." The Supreme Court continued:

> "When we turn to the consideration of the act it seems evident that Congress has dealt with the tangible thing, a copy of which is required to be filed with the Librarian of Congress, and whenever the words are used (copy or copies) they seem to refer to the term in its ordinary sense of indicating reproduction or duplication of the original..."
>
> "The definition of 'copy' which most commends itself to our judgment is perhaps as clear as can be made, and defines a copy of a musical composition to be 'a written or printed record of it in intelligible notation'... The statute has not provided for the protection of the intellectual conception apart from the thing produced, however meritorious such conception may be, but has provided for the making and filing of a tangible thing, against the publication and duplication of which it is the purpose of the statute to protect the composer."

Finally the Supreme Court observed:

> "It may be true that the use of these perforated rolls, in the absence of statutory protection, enables the manufacturers thereof to enjoy the use of musical compositions for which they pay no value. But such considerations properly address themselves to the legislative and not to the judicial branch of the Government."

Inasmuch as this decision of the Supreme Court in the White-Smith case has often been cited for the proposition that a reproduction of a work which is not visible to the human eye is not an infringement, it should be noted here that this proposition has been greatly modified, and eventually negated, by subsequent legislation and later court rulings, as we shall see.

The foregoing pronouncements in the White-Smith decision can be characterized as being not so much a statement of judicial philosophy concerning

the adaptation of the copyright law to new technology, as it is an instance of the general principle of narrow judicial construction of statutes on the premise that new issues not specifically dealt with in a statute should be left for Congress to determine.

A philosophical view of how the copyright law should be adapted to new technology is enunciated in the concurring opinion of Justice Holmes in the White-Smith case. He began by saying:

> "In view of the facts and opinions in this country and abroad to which the majority opinion has called attention I do not feel justified in dissenting from the judgment of the court, but the result is to give to copyright less scope than its rational significance and the ground on which it is granted seem to me to demand...

He then went on:

> "The ground of this extraordinary right (i.e., copyright) is that the person to whom it is given has invented some new collocation of visible or audible points, -- of lines, colors, sounds or words. The restraint is directed against reproducing this collocation, although but for the invention and the statute any one would be free to combine the contents of the dictionary, the elements of the spectrum, or the notes of the gamut in any way that he had the wit to devise. The restriction is confined to the specific form, to the collocation devised, of course, but one would expect that, if it was to be protected at all, that collocation would be protected according to what was its essence. One would expect the protection to be coextensive not only with the invention, which, though free to all, only one had the ability to achieve, but with the possibility of reproducing the result which gives to the invention its meaning and worth. A musical composition is a rational collocation of sounds apart from concepts, reduced to a tangible expression from which the collocation can be reproduced either with or without continuous human intervention. On principle, anything that mechanically reproduces that collocation of sounds ought to be held a copy, or if the statute is too narrow ought to be made so by a further act, except so far as some extraneous consideration of policy may oppose."

As shown by the later decisions dealing with motion pictures, which were reviewed above, and by those relating to radio broadcasts, to be reviewed below, the philosophical approach of Justice Holmes in the

White-Smith case was to receive greater acceptance thereafter than the principle of narrow construction adopted in the majority opinion.

A.2.3.1.1 Copyright Act of 1909. At the time of the White-Smith decision, Congress was working on legislative proposals that were to become the copyright law revision of 1909. The most hotly disputed issue in the legislative proceedings was a proposal to give copyright owners of musical compositions a new exclusive right to make recordings of their music. (Incidentally, the fact that Congress was considering this proposal may have been a factor in the Supreme Court's pronouncement in White-Smith that the issue of making recordings should be resolved by Congress rather than by the Court.) During the hearings on the revision bills (1906-1908) there was strong and repeated testimony from a number of witnesses that one recording company (Aeolian) had made contracts with most of the major music publishers whereby that company would acquire exclusive licenses to make recordings under the anticipated new law, in all the music controlled by those publishers then and for many years thereafter.

The reaction of Congress to this testimony is shown in the following passage from the House Committee Report (No. 2222, 60th Cong.) on the bill eventually enacted:

> "It was at first thought by the committee that the copyright proprietors of musical compositions should be given the exclusive right to do what they pleased with the rights it was proposed to give them to control and dispose of all rights of mechanical reproduction, but the hearings disclosed that the probable effect of this would be the establishment of a mechanical music trust."

Elsewhere in the same Report the House Committee said:

> "Your committee have felt that justice and fair dealing, however, required that when the copyrighted music of a composer was appropriated for mechanical reproduction the composer should have some compensation for its use and the composer should have the further right of forbidding, if he so desired, the rendition of his copyrighted music by the mechanical reproducers. How to protect him in these rights without establishing a great music monopoly was the practical question the committee had to deal with. The only way to effect both purposes, as it seemed to the committee, was, after giving the composer the exclusive right to prohibit the use of his music by the mechanical reproducers, to provide that if he used or permitted the use of his music for such purpose then,

upon payment of a reasonable royalty, all who desired might reproduce the music."

So was born the first compulsory license under the copyright law. Section 1(e) of the Copyright Act of 1909 gave the copyright owner of a musical composition the exclusive right "to make any arrangement or setting of it or of the melody of it in any system of notation or any form of record in which the thought of an author may be recorded and from which it may be read or reproduced"; but to this was added the condition that "whenever the owner of a musical copyright has used or permitted or knowingly acquiesced in the use of the copyrighted work upon the parts of instruments serving to reproduct mechanically the musical work, any other person may make similar use of the copyrighted work upon the payment to the copyright proprietor of a royalty of 2 cents on each part manufactured, to be paid by the manufacturer thereof."

It may also be noted here that the 1909 Act provided that the copyright owner of a dramatic work was to have the exclusive right to make "any transcription or record thereof by or from which, in whole or in part, it may in any manner or by any method be exhibited, performed, represented, produced, or reproduced." (sec. 1(d)); and that the same right was extended to nondramatic literary works by an amendment (of sec. 1(c)) in 1952.

Thus, in the 1909 Act, Congress did not overturn the holding of the Supreme Court in White-Smith that a reproduction of a work which was not visually perceptible was not a "copy" of the work, and did not infringe the right to make "copies"; but it rendered that holding ineffectual with respect to the making of any form of "record" from which a musical, dramatic, or nondramatic literary work may be reproduced in any manner.

A.2.3.1.2 Copyright Act of 1976. The new copyright law revision of 1976 confirms the exclusive right of the copyright owners of all categories of works "to reproduce the copyrighted work in copies or phonorecords" (sec. 106 (1)). The definition of both of these terms is stated broadly (in sec. 101):

> "'Copies' are material objects, other than phonorecords, in which a work is fixed by any method now known or later developed, and from which the work can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device."
>
> "'Phonorecords' are material objects in which sounds, other than those accompanying a motion picture or other audiovisual

work, are fixed by any method now known or later developed, and from which the sounds can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device."

These provisions and definitions in the Act of 1976 seem to wipe out any lingering vestige of the White-Smith decision.

The 1976 Act retains the compulsory license for the making of phonorecords of musical works, with several changes in detail (sec. 115). Thus, the royalty rate for each musical work recorded is increased from the old rate of 2 cents per record manufactured, to the new rate, per record distributed, of two and three-fourth cents, or one-half cent per minute or fraction thereof of playing time, whichever amount is larger.

This history of the copyright law respecting the right to make sound recordings of musical and other works demonstrates the adaptation of that law to new technology by legislative enactment where the courts abstained from effecting a judicial adaptation.

A.2.3.2 Sound Recordings as Copyrightable Works. The technological development of sound recording brought forth another question in the field of copyright: Are sound recordings in themselves (as distinguished from the musical or literary works recorded) works of authorship that should be accorded copyright protection?

Sound recordings, as exemplified by phonograph records or tapes, generally contain more than the musical or literary work reproduced aurally: They embody also the rendition of the musical or literary work by performers (musicians, singers, actors, etc.), as well as the technical skill and esthetic judgment of the director and operators of the various mechanisms that are manipulated to produce the finished record. Performers were long ago regarded as creative artists but their aural performances were evanescent events before the invention of sound recording devices. The advent of those devices, making it possible to preserve sounds in a fixation from which they could be reproduced, raised the possibility of treating recorded performances as works of authorship, and opened up the question of whether the recordings of those performances should be given the protection of copyright.

The first suggestion that sound recordings should be made a category of copyrightable works came in a proposal advanced by producers of such recordings in the early stages of the Congressional proceedings in 1906

on the general revision of the copyright law. During the progress of those proceedings in the following two years, the producers of sound recordings became concerned primarily with opposing the extension to composers of the exclusive right to make recordings of their music; and since the Constitutional arguments presented by the producers on the latter issue would have barred the coverage of sound recordings under the copyright law, they dropped their efforts to secure such coverage. The Copyright Act of 1909 therefore contained no provision for securing copyright in sound recordings, and the House Committee in its Report (No. 2222, 60th Cong.) on the 1909 Act said:

> "It is not the intention of the committee to extend the right of copyright to the mechanical reproductions themselves, but only to give the composer or copyright proprietor (of musical compositions) the control, in accordance with the provisions of the bill, of the manufacture and use of such devices."

Thereafter the Copyright Office, as well as most commentators, took the position that sound recordings were not copyrightable under the 1909 Act, both because the categories of copyrightable works listed in the Act did not include them, and because they did not fit into the basic requirements of the Act as to copyright notice and the deposit of copies.

Beginning in the 1930s, a number of court decisions held that the unauthorized reproduction of the recording of a performance could be enjoined under principles of unfair competition or "common law copyright" (the latter being property rights under the common law in unpublished works). The judges differed as to whether the sale of records constituted "publication" so as to terminate common law copyright protection.

The most important of these decisions was Capitol Records, Inc. v. Mercury Records Corp., 221 F. 2d 657 (2d Cir. 1955), in which the court made several significant pronouncements. It concluded first:

> "There can be no doubt that, under the Constitution, Congress can give to one who performs a public domain musical composition the exclusive right to make and vend phonograph records of that rendition."

Thus, it disposed of the issue, which has been much disputed, of whether a recorded performance could be considered the "writing" of an "author" within the scope of the Constitutional clause on copyright. The court then went on to conclude that Congress had not provided for copyright protection of recorded performances either before or in the Act of 1909.

It concluded further that under the common law of New York the recorded performance was protected against unauthorized duplication, and that the sale of records did not terminate those common law rights.

In a dissenting opinion in the Capitol Records case, Judge Learned Hand agreed that:

> "The performance or rendition of a 'musical composition' is a 'Writing" under Article I, Sec. 8, Cl. 8 of the Constitution separate from, and additional to, the 'composition' itself. It follows that Congress could grant the performer a copyright upon it, provided it was embodied in a physical form capable of being copied... Now that it has become possible to capture these contributions of the individual performer upon a physical object that can be made to reproduce them, there should be no doubt that this is within the Copyright Clause of the Constitution."

Judge Hand also agreed with the court's conclusion, though on somewhat different reasoning, that Congress had not provided for copyright in recorded performances; and he agreed further that such recordings qualified for common law protection, but differed in his view that common law protection was terminated by the sale of records. Concerning this last point he observed:

> "I recognize that under the view I take the plaintiff can have only a very limited use of his records. This is indeed a harsh limitation, since it cannot copyright them... Unhappily we cannot deal with the situation as we should like, because the copyrightability of such 'works' is a casus omissus from the Act. That was almost certainly owing to the fact that in 1909 the practice of recording the renditions of virtuosi had not sprung up."

The Capitol Records and other similar court decisions paved the way for Congressional legislation extending copyright protection to sound recordings, by holding that recordings of performances were the "writings" of "authors" within the scope of the Constitution, and that they merited the protection afforded by copyright. The influences of these court decisions was augmented by the concurring views expressed by most commentators.*

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* See, for example, Chafee, Reflections on the Law of Copyright in 45 COLUMBIA LAW REVIEW 503 (1945)

A.2.3.2.1 Congressional Legislation. The successive bills for general revision of the copyright law, beginning with the bill first considered by Congress in 1965, contained provisions naming "sound recordings" as a category of copyrightable works, and giving the copyright owner of those (and other) works the exclusive rights "to reproduce the copyrighted work in copies or phonorecords" and "to distribute copies or phonorecords of the copyrighted work to the public." During the hearings on the revision bills there was virtually no opposition to these provisions.

When action on the general revision bills lagged (for reasons unrelated to the question of protecting sound recordings) and it became evident that "record piracy" had become rampant and was growing, a special bill was introduced to add to the existing copyright statute, provisions for the protection of sound recordings against unauthorized duplication. The provisions of this special bill were the same in substance as those in the general revision bills, making sound recordings a new category of copyrightable works and giving the copyright owner the exclusive rights to reproduce them and to distribute them to the public. This special bill was enacted on October 15, 1971, as Public Law 92-140.

The general revision bill was eventually enacted on October 19, 1976, as Public Law 94-553. To expand on the earlier summary of its pertinent provisions:

-- "Sound recordings" are listed among the categories of works protected by copyright (sec. 102(a)), and that term is defined (in sec. 101) as "works that result from the fixation of a series of musical, spoken, or other sounds, but not including the sounds accompanying a motion picture or other audiovisual work, regardless of the nature of the material objects, such as disks, tapes, or other phonorecords in which they are embodied."

-- The copyright owner of all categories of protected works, including sound recordings, has the exclusive rights "(1) to reproduce the copyrighted work in copies or phonorecords; (2) to prepare derivative works based upon the copyrighted work; (3) to distribute copies or phonorecords of the copyrighted work to the public by sale or other transfer of ownership, or by rental, lease, or lending." (sec. 106).

-- It is stated specifically (in sec. 114) that the exclusive rights of the copyright owner in a sound recording do not include any right of performance (this was a matter of

sharp controversy in the hearings); and that the right to reproduce a sound recording is limited to the duplication of the actual sounds fixed in the recording and does not extend to the independent fixation of other sounds even though they imitate those in the copyrighted recording.

-- Generally speaking, wherever the new Act makes provisions respecting "copies" of copyrighted works, it extends those provisions to "phonorecords" as well. (The definitions in sec. 101 of "copies" and "phonorecords" have been quoted earlier.)

In sum, the history of the extension of copyright protection to sound recordings reflects a situation where court opinions concerning a new technology, supported by the concurring views of commentators, laid the foundation for subsequent legislation.

A.2.4 RADIO AND TELEVISION BROADCASTS

The Copyright Act of 1909 incorporated in substance, in section 1, provisions giving the copyright owner the exclusive right to "perform" the work "publicly" in the case of a dramatic work, and to "perform" it "publicly for profit" in the case of a musical composition; and the 1909 Act added, for the new category of lectures and similar works prepared for oral delivery, the corresponding right to "deliver" the work "in public for profit." In 1909, of course, radio and television broadcasting was unknown; a public performance was thought of as a performance given in the presence of a group of persons assembled within sight or hearing of the performers.

A.2.4.1 Broadcasting as Performances. When radio broadcasting was developed and the use of copyrighted music and plays in radio broadcasts became common in the early 1920s, the question arose whether broadcasts of copyrighted works were public performances within the scope of the 1909 Statute. In the case of Jerome H. Remick & Co. v. American Automobile Accessories Co., 5 F. 2d 411 (6th Cir. 1925), this question was presented with respect to a radio broadcast of a musical work. The court held that the broadcast did constitute a public performance, saying:

> "While the fact that the radio was not developed at the time the Copyright Act...was enacted may raise some question as to whether it properly comes within the purview of the statute, it is not by that fact alone excluded from the statute. In other words, the statute may be applied to new situations not anticipated by Congress, if, fairly construed, such situations come

within its intent and meaning. Thus it has been held both in this country and England that a photograph was a copy or infringement of a copyrighted engraving under statutes passed before the photographic process had been developed ... While statutes should not be stretched to apply to new situations not fairly within their scope, they should not be so narrowly construed as to permit their evasion because of changing habits due to new inventions and discoveries."

"... A performance, in our judgment, is no less public because the listeners are unable to communicate with one another, or are not assembled within an inclosure, or gathered together in some open stadium or park or other public place. Nor can a performance, in our judgment, be deemed private because each listener may enjoy it alone in the privacy of his home. Radio broadcasting is intended to, and in fact does, reach a very much larger number of the public at the moment of the rendition than any other medium of performance. The artist is consciously addressing a great, though unseen and widely scattered audience, and is therefore participating in a public performance."

This decision was frequently cited and consistently followed and its rul- was generally accepted in practice by the broadcasters and other concerned.

The conclusion that broadcasting constitutes a public performance was confirmed, though indirectly, by a statutory enactment in 1952 (66 Stat. 752) the primary purpose of which was to extend performing and recording rights to nondramatic literary works. At the request of the broadcasting industry, a sentence was added to that enactment to place a limit of $100 on "the damages for the infringement by broadcast" of nondramatic literary works where the broadcaster was unaware and could not have reasonably foreseen that he was infringing.

A further question related to the broadcasting of music was whether such broadcasts were public performances "for profit," since the performance right in music was limited to those that were given "for profit." This question was also considered in the Remick v. Automobile Accessories case reviewed above, where the broadcasting station was operated by the manufacturer of radio products and supplies and was licensed as a commercial station and used as a medium for advertising its products. Citing earlier cases to the same effect, the court held the broadcasts to be public performances "for profit" and observed:

"That, under the Copyright Act, a public performance may be for profit, though no admission fee is exacted or no profit actually made, is settled by Herbert v. Shanley, 242 U.S. 591 ... It suffices, as there held, that the purpose of the performance be for profit, and not eleemosynary; it is against a commercial, as distinguished from a purely philanthropic, public use of another's composition, that the statute is directed. It is immaterial in our judgment, whether that commercial use be such as to secure direct payment for the performance by each listener, or indirect payment, as by a hat-checking charge, when no admission fee is required, or a general commercial advantage, as by advertising one's name in the expectation and hope of making profits through the sale of one's products, be they radio or other goods."

In later cases the question of whether radio broadcasting of music was "for profit" was considered in other circumstances where the commercial purpose was less evident. It would appear to be irrelevant here to review those cases. We note simply that broadcasts by commercial stations have generally been regarded as being for profit, either because they are operated as commercial businesses or because they carry commercial advertising, while broadcasts by stations licensed as noncommercial educational stations have generally been regarded as being not for profit.

A.2.4.2 Reception of Broadcasts as Performance. The development of broadcasting also gave rise to a more difficult question: was the reception of a broadcast (as the question arose initially, of a radio broadcast of music) in a place where the performance being broadcast would be reproduced, by means of the receiving equipment, for the entertainment of the public, a further performance under the 1909 Copyright Act?

This question reached the U.S. Supreme Court in the famous case of Buck v. Jewell-LaSalle Realty Co., 283 U.S. 191 (1931). In that case a hotel maintained a master radio set which was wired to loud speakers from which the radio programs could be heard in all of the public and private rooms in the hotel. The Court held that the hotel's reproduction of the broadcast performance, through its receiving set and loud speakers, for the entertainment of its guests, was itself a public performance under the statute. Because of the novelty of the technology involved and the far-reaching effect of the decision, and the parallel with the question of cable television retransmission of broadcasts which the Supreme Court ruled on more than 35 years later, the reasoning of the Court in the Jewell-LaSalle decision, by Justice Brandeis, merits quotation at some length:

"The defendant contends that the Copyright Act may not reasonably be construed as applicable to one who merely receives a composition which is being broadcast. Although the art of radio broadcasting was unknown at the time the Copyright Act of 1909 was passed, and the means of transmission and reception now employed is wholly unlike any then in use, it is not denied that such broadcasting may be within the scope of the act... The argument here urged, however, is that, since the transmitting of a musical composition by a commercial broadcasting station is a public performance for profit, control of the initial radio rendition exhausts the monopolies conferred...

"The defendant next urges that it did not perform because there can be but one actual performance each time a copyrighted selection is rendered, and that, if the broadcaster is held to be a performer, one who, without connivance, receives and distributes the transmitted selection, cannot also be held to have performed it. But nothing in the act circumscribes the meaning to be attributed to the term 'performance', or prevents a single rendition of a copyrighted selection from resulting in more than one public performance for profit. While this may not have been possible before the development of radio broadcasting, the novelty of the means used does not lessen the duty of the courts to give full protection to the monopoly of public performance for profit which Congress has secured to the composer...

"The defendant contends further that the acts of the hotel company were not a performance because no detailed choice of selections was given to it. In support of this contention it is pointed out that the operator of a radio receiving set cannot render at will a performance of any composition, but must accept whatever program is transmitted during the broadcasting period. Intention to infringe is not essential under the act... And knowledge of the particular selection to be played or received is immaterial. One who hires an orchestra for a public performance for profit is not relieved from a charge of infringement merely because he does not select the particular program to be played. Similarly, when he tunes in on a broadcasting station, for his own commercial purposes, he necessarily assumes the risk that in so doing he may infringe the performing rights of another...

"Second. The defendant contends that there was no performance because the reception of a radio broadcast is no different from listening to a distant rendition of the same program. (In footnote: "Hence it is urged that the radio receiving set

is no more than a mechanical or electrical ear trumpet for the better audition of a distant performance.") We are satisfied that the reception of a radio broadcast and its translation into audible sound is not a mere audition of the original program... Radio waves are not audible. In the receiving set they are rectified; that is, converted into direct currents which actuate the loudspeaker to produce again in the air sound waves of audible frequencies. The modulation of the radio waves in the transmitting apparatus, by the audible sound waves, is comparable to the manner in which the wax phonograph record is impressed by these same waves through the medium of a recording stylus. The transmitted radio waves require a receiving set for their detection and translation into audible sound waves, just as the record requires another mechanism for the reproduction of the recorded composition. In neither case is the original program heard; and, in the former, complicated electrical instrumentalities are necessary for its adequate reception and distribution. Reproduction in both cases amounts to performance... In addition, the ordinary receiving set, and the distributing apparatus here employed by the hotel company are equipped to amplify the broadcast program after it has been received. Such acts clearly are more than the use of mere mechanical acoustic devices for the better hearing of the original program. The guests of the hotel hear a reproduction brought about by the acts of the hotel in (1) installing, (2) supplying electric current to, and (3) operating the radio receiving set and loudspeakers. There is no difference in substance between the case where a hotel engages as orchestra to furnish the music and that where, by means of the radio set and loudspeakers here employed, it furnishes the same music for the same purpose."

This opinion of the Supreme Court in the Jewell-LaSalle case presents a prime example of analogizing the operation and effect of new technological devices with those of previously known devices that the law has already dealt with. In this opinion we see the Supreme Court taking much the same philosophical approach, to the adaptation of the copyright statute to new technology, as we have seen earlier in the court decisions on motion pictures, in the concurring opinion of Justice Holmes in White-Smith, in the judicial recognition of the possible extension of copyright to sound recordings in the Capitol Records case, and implicitly in the extension of the copyright statute by Congress to the products of new technology and their use.

It may be noted briefly that the ruling in Jewell-LaSalle was carried a step farther in the case of SESAC v. New York Hotel Statler Co., 19 F. Supp. 1 (S.D.N.Y. 1937). In the latter case, the hotel received the broadcast programs of two stations on a master receiving set and transmitted those programs to speakers in each of its individual guest rooms; each guest could turn the speaker in his room on to his choice of two programs or could turn it off. Relying on the Remick and Jewell-LaSalle decisions, the court held the transmission by the hotel of the copyrighted music in the broadcasts was a public performance for profit.

A.2.4.3 Wire Transmissions. Mention should be made of a process of transmitting performances of copyrighted works somewhat similar, in its effect, to broadcasting; that is, the use of wire systems for supplying performances of music from a central source to a number of subscribing business establishments for the entertainment of their patrons. (A well-known system of this kind is Muzak.) In Leo Feist, Inc. v. Lew Tendler Tavern, 162 F. Supp. 129 (E.D. Pa. 1958), both the company that supplied the music by transmissions over leased wires and the tavern in which the music was received and played over loudspeakers were held to have given public performances for profit. Citing several earlier cases, including Jewell-LaSalle and SESAC, the court said:

> "The circumstance of the novelty of the combination of mechanical means involved, however, does not appear to vary the principles established in the three cases heretofore cited. For that matter, the numerous cases of musical infringement under the act involve infinite combinations of means of musical performance. The principles applied, however, are those of the same leading cases, despite the individual differences as to where and how the music is produced, transmitted, and made audible."

The foregoing decision of the District Court in the Lew Tendler case was affirmed by the Circuit Court on appeal: 267 F. 2d 494 (3rd Cir. 1959).

(The question of retransmissions of broadcasts as public performances of the works in the broadcast was to be raised again years later in the context of retransmissions by cable television systems. We shall consider the cases dealing with cable television below.)

A.2.4.4 Copyright Act of 1976. The recently enacted revision of the copyright law gives statutory confirmation to the results reached in the decisions reviewed above concerning broadcasts and wire transmissions

of performances of copyrighted works, and their reception and retransmission. Thus, the 1976 Act provides that:

-- In the case of enumerated categories of works capable of performance, the copyright owner has the exclusive right "to perform the copyrighted work publicly" (sec. 106(4). (This right is subject to certain exemptions provided for elsewhere in the Act which need not be detailed here).

-- To "perform" a work is defined as meaning "to recite, render, play, dance, or act it, either directly or by means of any device or process or, in the case of a motion picture or other audiovisual work, to show its images in any sequence or to make the sounds accompanying it audible" (Sec. 101).

-- The exclusive right of the copyright owner "to display the copyrighted work publicly" is specified for the first time in the new statute with respect to enumerated categories of works that may be so displayed (sec. 106(5)). (This right of public display is subject to some of the same exemptions as the right of public performance.)

-- To "display" a work is defined as meaning "to show a copy of it, either directly or by means of a film, slide, television image, or any other device or process or, in the case of a motion picture or other audiovisual work, to show individual images nonsequentially" (sec. 101).

-- To perform or display a work "publicly" is defined as meaning:

"(1) to perform or display it at a place open to the public or at any place where a substantial number of persons outside of a normal circle of a family and its social acquaintances is gathered; or

(2) To transmit or otherwise communicate a performance or display of the work to a place specified by clause (1) or to the public, by means of any device or process, whether the members of the public capable of receiving the performance or display receive it in the same place or in separate places and at the same time or at different times" (sec. 101).

-- To "transmit" a performance or display is defined as meaning "to communicate it by any device or process whereby images or sounds are received beyond the place from which they are sent" (sec. 101).

It will be observed that the preceding definitions embrace all forms of transmission and communication, including broadcasting and wire transmission, by which a performance or display is brought to members of the public, in a group or individually, at another place or places. The definitions would also include the communication to the public of a performance or display reproduced from a broadcast or wire transmission.

A.2.5 PHOTOCOPYING

In common usage, the duplication of a printed page by modern copying machines is referred to as "photocopying" whether the process used by the machines is photographic or is of another kind such as a thermal or xerographic process. As the making of copies by such machines became easier, faster, more effective, and less costly, the practice of using those machines to provide copies of copyrighted material for persons engaged in study, research, teaching, and other activities, created serious and difficult problems concerning the application of the copyright law to such copying.

The 1909 Copyright Act (like all the earlier acts) made no provision allowing any copying of copyrighted material without the copyright owner's permission. The Act gave the copyright owner the exclusive right to make copies of his work, without qualification. The courts, however, over a long period of time, had developed the doctrine of "fair use" which, stated in broad terms, allowed the copying of small portions of copyrighted works, for a legitimate purpose, in circumstances where such copying would have no appreciable effect upon the copyright owner's market for his work. The court decisions dealt mainly with short quotations from the work of one author in the later works of other authors; how far the doctrine of fair use extended to photocopying for research or scholarly purposes remained problematical.

At an early stage when the photocopying processes were less proficient and more costly, the processes then in use being mainly photostatic and mimeographic, copies made by libraries for scholars and researchers were relatively few in number and short in length and were made in response to isolated and occasional requests. Even then the existence of a copyright problem was recognized, and the first efforts to resolve the problem were made by members of the groups concerned -- publishers, scholarly and research organizations, and libraries -- who sought to work out an agreement defining the area and limits of permissible photocopying. In 1935 members of those groups adopted a statement known as the "Gentlemen's Agreement" which stated that a library owning copyrighted books or periodicals "may make and deliver a single photographic reproduction or reduction of a part thereof to a scholar representing in writing that he desires such reproduction in lieu of loan of such

publication or in place of manual transcription and solely for the purpose of research."

The "Gentlemen's Agreement" had no binding effect for several reasons: Among others, the persons signing it were not representative of the generality of the groups concerned. Nevertheless, it suggested guidelines that were followed thereafter by many libraries, and that were to be referred to as a basis for working out a solution to the copyright issue concerning library photocopying. It is also significant as an example of attempts to adapt the copyright law to a new technology by a practical agreement negotiated between the opposing interest groups.

The photocopying problem became acute as copying machines became highly proficient in producing excellent reproductions rapidly and at steadily declining cost. During the 1960s and early 1970s the volume of copyrighted material being photocopied by libraries, as well as in schools and elsewhere, ballooned continuously to the point, and beyond the point, where publishers -- especially of scientific and technical journals and of educational texts -- expressed the fear that the resulting loss of subscriptions and sales might force them to discontinue publication of some of those materials.

The problem was given attention in the preliminary stages of the program looking toward the general revision of the copyright law*, but the groups concerned were agreed, when the first revision bill to be considered by Congress was introduced in 1965, that no specific rules for library photocopying should be incorporated in the bill; they were all willing to leave the photocopying issue for resolution by agreement among themselves or by the courts under the general principles of the fair use doctrine.

Meanwhile, a suit was instituted in the U.S. Court of Claims, Williams and Wilkins Co., v. United States, in which the plaintiff, a publisher of medical journals and books, charged two Government libraries, the National Institutes of Health library and the National Library of Medicine, with having infringed the copyright in several of its medical journals by supplying photocopies of articles in those journals to the staff researchers of NIH and to medical libraries, research institutes, and practitioners throughout the country. The main defense (among

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* See the Report of the Register of Copyrights on the General Revision of the U.S. Copyright Law, published as a House Judiciary Committee Print in July, 1961, at p. 25.

others) argued on behalf of the libraries was that their photocopying was a fair use. The case was a particularly difficult one because it presented a situation of copying on such a large scale as to strain the usual limits of fair use and perhaps jeopardize the economic viability of publishing such journals; but, on the other hand, copying for a noncommercial social purpose -- to supply medical and related scientific information to those engaged in medical research and health maintenance -- as worthy and essential as any that could be thought to justify copying as a fair use.

In both the initial opinion of the Commissioner of the Court of Claims (172 USPQ 670, 1972) and the subsequent decision by the full Court (487 F. 2d 1345, 1973), it was noted that fair use is a judicially-created doctrine that cannot be defined with precision, and that the House Judiciary Committee, in its Report (No. 83, 90th Cong.) on the copyright law revision bill then pending had stated that the principal factors in determining what constitutes a fair use were:

> "(a) the purpose and character of the use, (b) the nature of the copyrighted work, (c) the amount and substantiality of the material used in relation to the copyrighted work as a whole, and (d) the effect of the use on a copyright owner's potential market for and value of his work."

The Commissioner held that the photocopying practices of the two Government libraries were not within the bounds of fair use but constituted infringement of the copyrights. As he saw it:

> "Defendant's photocopying is wholesale copying and meets none of the criteria for 'fair use.' The photocopies are exact duplicates of the original articles; are intended to be substitutes for, and serve the same purpose as, the original articles; and serve to diminish plaintiff's potential market for the original articles since the photocopies are made at the request of, and for the benefit of, the very persons who constitute the plaintiff's market."

The full Court divided 4 to 3 on the issue. The majority stressed the social importance of making information readily available for medical research and played down the potential damage to the copyright owner, concluding that the photocopying practices of the two libraries were fair use. Quoting from the majority opinion:

> "While, as we have said, this record fails to show that plaintiff (or any other medical publisher) has been substantially

harmed by the photocopying practices of NIH and NLM, it does show affirmatively that medical science will be hurt if such photocopying is stopped. Thus, the balance of risks is definitely on defendant's side -- until Congress acts more specifically, the burden on medical science of a holding that the photocopying is an infringement would appear to be much greater than the present or foreseeable burden on plaintiff and other medical publishers of a ruling that these practices fall within 'fair use.'"

The majority opinion wound up by calling for Congressional resolution of the problem:

> "Finally, but not at all least, we underline again the need for Congressional treatment of the problems of photocopying... The Courts are now precluded, both by the Act and by the nature of the judicial process, from contriving pragmatic or compromise solutions which would reflect the legislature's choice of policy and its mediation among the competing interests... Hopefully, the result in the present case will be but a 'holding operation' in the interim period before Congress enacts its preferred solution."

The three judges of the Court of Claims who dissented from the majority opinion expressed their agreement with the Commissioner's view of the case, saying:

> "What we have before us is a case of wholesale, machine copying, and distribution of copyrighted material by defendant's libraries on a scale so vast that it dwarfs the output of many small publishing companies...
>
> "It is indisputed that the photocopies in issue here were exact duplicates of the original articles; they were intended to be substitutes for and they served the same purpose as the original articles. They were copies of complete copyrighted works within the meaning of Sections 3 and 5 of the Copyright Act. This is the very essence of wholesale copying and, without more, defeats the defense of fair use."

The minority opinion sought to counter the fear expressed by the majority that a holding of infringement in this case would result in stopping entirely the furnishing of photocopies needed by medical researchers; the minority suggested that those needs could be met by arrangements for licensing photocopying.

The Williams and Wilkins case was accepted for review by the Supreme Court where, after the arguments were heard, the Court split 4 to 4 without an exposition of the reasoning on the two sides (420 U.S. 376, 1975). The case thus came to an inconclusive end.

A.2.5.1 The Copyright Act of 1976. During the proceedings for general revision of the copyright law, the question of photocopying came up primarily and most importantly in two contexts; in connection with copying by teachers for classroom use in schools, and with copying by libraries for the use of scholars and researchers. The proposals for legislation in each of these contexts were subjects of major controversy. Two sets of provisions evolved in the successive revision bills; section 107 dealing with fair use generally and containing special references to copying for purposes of teaching, scholarship, or research; and section 108 dealing specifically with copying by libraries.

Section 107, providing that "the fair use of a copyrighted work...is not an infringement of copyright," specifies that:

> "In determining whether the use made of a work in any particular case is a fair use the factors to be considered shall include --
>
> (1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
>
> (2) the nature of the copyrighted work;
>
> (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
>
> (4) the effect of the use upon the potential market for or value of the copyrighted work."

As noted in the Congressional committee reports on the revision bills, this statement of the determining factors is a distillation of those stated by the courts in the line of decisions that developed the fair use doctrine, except for the phrase in clause (1) reading "including whether such use is of a commercial nature or is for nonprofit educational purposes." This added phrase was thought to be within the spirit of the court-developed doctrine and was added to the bill as a concession to the educators.

Section 107 also specifies, as examples of uses that may be fair use (if they come within the stated criteria):

"The fair use of a copyrighted work, including such use by reproduction in copies or phonorecords or by any other means..., for purposes such as criticism, comment, news reporting, teaching (including multiple copies for classroom use), scholarship, or research..."

It may be noted that the parenthetical phrase was added to the bill in the late stages of the Congressional proceedings as a further concession to the educators.

The language of section 107 pertaining to copying for educational purposes reflects agreements reached between the educator and copyright owner groups over a period of time. In addition, the Reports of the Congressional Committees on earlier versions of the revision bill (House Report No. 83, 90th Cong., and Senate Reports No. 93-983 and No. 94-473) contained an explanatory discussion in considerable detail of how the four criteria of fair use stated in section 107 would apply to copying by teachers for classroom use, which also reflected an understanding between those groups. Further, and with more finality, the House Committee Report (No. 94-1476 at pages 67-71) sets forth the texts of agreements between educator groups on one hand and representatives of authors and publishers of books, periodicals, and music on the other, stating in precise terms, as guidelines, the minimum standards of fair use copying for educational purposes. These agreements were reached at the urging of the Congressional committees, after a series of meetings between the interested groups.

The more far-reaching problem raised by modern photocopying devices -- that of copying by libraries for scholars and researchers -- is dealt with in section 108 of the new statute. (That section also provides for copying for certain internal library purposes but we are not concerned with that here.) In main substance, section 108(d) and (e) permits libraries to make, for any user requesting it, a single copy of no more than one article or other contribution to a copyrighted collection or periodical issue or of a small part of any other work (such as a book), or a single copy of an entire work or a substantial part of it if the library has first determined that a copy cannot be obtained from trade sources at a fair price. (This right of a library to make single copies for users is subject to certain specified conditions and exceptions which we need not detail here.)

To preclude multiple copying under the guise of repeated single copying, section 108(g) states that, while the right of a library to make copies extends to "the isolated and unrelated reproduction...of a single copy...of the same material on separate occasions," it does not extend

to "the related or concerted reproduction...of multiple copies...of the same material, whether made on one occasion or over a period of time, and whether intended for aggregate use by one or more individuals or for separate use by the individual members of a group;" and to preclude wholesale copying under a systematic program whereby one library would serve as the source of material for a number of other libraries or persons who might otherwise subscribe for or purchase copies, section 108 states further that the right of a library to make copies does not extend to "the systematic reproduction...of single or multiple copies," with the proviso that this does not prevent a library "from participating in interlibrary arrangements that do not have, as their purpose or effect, that the library...receiving such copies...for distribution does so in such aggregate quantities as to substitute for a subscription to or purchase of such work."

This latter provision of section 108 excluding "systematic reproduction" had been objected to strongly by library groups, and the proviso to permit "interlibrary arrangements" was added in an effort to meet those objections. The proviso, however, was thought to be too vague in its reference to "such aggregate quantities as to substitute for a subscription to or purchase of such work." Accordingly, the National Commission on New Technological Uses of Copyrighted Works (CONTU) undertook to bring the interested parties together to see if agreement could be reached on a practical definition of that phrase, and it succeeded in formulating a set of guidelines that were accepted by the several groups concerned. These guidelines are set forth in the Conference Report (H. Rept. No. 94-1733, at pages 71-73) on the bill which was then enacted. In essence, the guidelines state that the "aggregate quantities" limitation in the proviso would permit, for any requesting library within any calendar year, not more than five copies of articles published in any given periodical during the preceding five years, and not more than five copies of any other material from any given work (including a collective work) during the entire period of copyright.

So it was that the complex and multi-faceted resolution of the problem of adapting the copyright law to the availability of modern copying machines was achieved through the legislative process. The one appeal to the courts to resolve the issue -- the Williams and Wilkins case -- proved to be futile. As the Court of Claims observed, the problem of photocopying in its broad and varied aspects did not lend itself to judicial resolutions; the Court could do no more than to decide whether the photocopying done in the particular circumstances of the case before it was or was not an infringement of copyright under the existing law; Congressional action was needed to examine the wide range of situations in which photocopying could be a useful practice, and to arrive at policy determinations that in certain circumstances and under certain conditions

photocopying should be permitted free of copyright while other circumstances and conditions called for subjecting photocopying to copyright restrictions. On the foundation of the fair use doctrine developed earlier by the courts, the principles underlying the "Gentlemen's Agreement" worked out initially be some of the interested groups, and the practical and equitable considerations presented by the needs of the several interested groups, Congress was able to establish sets of basic principles and subsidiary conditions and exceptions to resolve the issues in the variety of situations that had arisen or could be foreseen. In this process Congress was aided by the spirit of compromise and accommodation in which the interested groups negotiated agreements among themselves on the principles of the legislative provisions and on practical guidelines for their application.

A.2.6 CABLE TELEVISION SYSTEMS

During the early 1960s commercial enterprises began to be organized to bring to subscribers, by means of new technologies, using special antennas located on high points and a network of cables and amplifiers, television broadcasts of stations whose signals could not be received satisfactorily by the subscribers off-the-air because of the distance or the hilly terrain between the station and the location of the subscribers. By the middle of that decade such commercial enterprises, known as cable television or CATV systems, were proliferating rapidly and expanding their operations to carry more, and farther distant, broadcasting stations; and it had become apparent that a copyright problem of considerable magnitude was involved in their operation. Television broadcast programs commonly included performances of copyrighted motion pictures, plays, music, and other works, for which broadcasters obtained licenses from the copyright owners. Was the retransmission of the broadcast programs by a cable system to its subscribers to be treated as a further performance of the copyrighted works which infringed the copyright owners' exclusive right of public performance?

The existence of this problem and its economic importance for copyright owners and the operators of cable systems, and indirectly for broadcasters, had come to the attention of the House Subcommittee by the time it held its first hearings, in 1965, on the initial bill for general revision of the copyright law. The testimony at the hearings demonstrated that the issue was highly controversial, and that it involved many ramifications pertaining to the economic position and potential growth of cable systems, and their potential impact upon broadcasters as well as copyright owners. It was also evident that the copyright problem was complicated by being intertwined with the problems of communications policy relating to the nations' broadcasting system that were dealt with by the Federal Communications Commission.

In 1966, after its hearing had been completed, the House Subcommittee formulated a complex set of provisions for inclusion in the revision bill by which it proposed to reconcile the divergent views and needs of the interested parties. The Subcommittee recognized that the copyright problem could not be resolved by a uniform rule under which all cable retransmissions would be an infringement, or not an infringement, of copyright; it proposed that in some situations retransmissions by a cable system would be exempt from copyright, in certain other situations their retransmissions would be subject to copyright, in still other situations their retransmissions (of broadcasts from another area) would become subject to copyright only if they were given advance notice that a local broadcasting station had an exclusive license to show the program in the local area, and in yet other situations (where they brought the broadcasts of distant stations into an area not adequately served by local stations) they would be liable only for payment of a reasonable license fee.

Meanwhile, the problem was brought before the courts in the case of United Artists Television, Inc., v. Fortnightly Corp., where a cable system brought to its subscribers the television programs of several stations whose signals could not be received satisfactorily by the subscribers because of the intervening mountainous terrain. The copyright owners of motion pictures shown in the broadcasts retransmitted by the cable system sued the system for infringement. The District Court (255 F. Supp. 177, S.D.N.Y. 1966) held that the retransmission constituted infringement of the copyright owner's exclusive right of public performance. On appeal, the Circuit Court of Appeals reached the same conclusion (377 F. 2d 872, 1967). Both the District and Circuit Courts considered this case to be parallel with those decided a generation earlier, particularly the Remick, Jewell-LaSalle, and SESAC cases (reviewed above in the portion of this report dealing with radio and television broadcasts); in those earlier cases, broadcasts of copyrighted works, and the public diffusion of receptions of such broadcasts, were held to be infringing public performance. Of particular interest here is the philosophical approach stated in the District Court opinion in the Fortnightly case as to the judicial application of the 1909 Copyright Law to the new technology of cable retransmission of broadcasts:

> "The updating of statutory language to accommodate it with current technological advances is part of the genius of our law to adapt and to grow. The achievements of modern science and technology surpass the imagined marvels of the philosopher's stone and Aladdin's lamp. The practical necessities of such an age require judicial recognition of the contemporary meaning of the words of the Copyright Act...

> "It is hardly conceivable that Congress intended the statute to be read with a strangling literalness so as to require it to be amended on a month-to-month basis as the means of keeping pace with science and technology. The responsibility of keeping the Copyright Law a living law devolves primarily, though not exclusively, upon the courts whose traditional function of statutory interpretation and construction, if effectively performed, will achieve in great measure the desirable object of accommodating the statute to the realities of modern science and technology."

The decision of the District and Circuit Courts in this case was destined, however, to be reversed by the Supreme Court: Fortnightly Corp. v. United Artists Television, Inc., 392 U.S. 390 (1968). To the surprise of most commentators, the Supreme Court held, in a 5 to 1 decision, that the retransmission of broadcasts by the cable system to its subscribers did not constitute a performance of the works in the broadcast within the meaning of the Copyright Act. The Supreme Court approached the question by saying:

> "At the outset it is clear that the petitioner's systems did not 'perform' the respondent's copyrighted works in any conventional sense of that term, or in any manner envisaged by the Congress that enacted the law in 1909. But our inquiry cannot be limited to ordinary meaning and legislative history, for this is a statute that was drafted long before the development of the electronic phenomena with which we deal here. In 1909 radio itself was in its infancy, and television had not yet been invented. We must read the statutory language of 60 years ago in the light of drastic technological change."

Nevertheless, the Court held that the cable retransmission was not a "performance" under the Act. It reasoned:

> "Broadcasters have judicially been treated as exhibitors, and viewers as members of a theater audience. Broadcasters perform. Viewers do not perform. Thus, while both broadcasters and viewers play crucial roles in the total television process, a line is drawn between them. One is treated as active performer; the other, as passive beneficiary.
>
> "When CATV is considered in this framework, we conclude that it falls on the viewer's side of the line. Essentially, a CATV system no more than enhances the viewer's capacity to receive the broadcaster's signal; it provides a well-located antenna with an efficient connection to the viewer's television set."

In his lone dissent, Justice Fortas agreed with the lower courts that the precedents of the Jewell-LaSalle and SESAC decisions should be followed here. He observed that any decision of the Court -- either that CATV systems were liable for copyright infringement, or that they were not -- had dangerous implications for one party or the other, and commented:

> "Our major object, I suggest, should be to do as little damage as possible to traditional copyright principles and to business relationships, until the Congress legislates and relieves the embarrassment which we and the interested parties face."

Justice Fortas said that the majority opinion abandoned the teachings of the precedents "in an attempt to foster the development of CATV", and he had noted earlier that "it is darkly predicted that the imposition of full liability upon all CATV operations could result in the demise of this new, important instrument of mass communications." The majority opinion, in a footnote, said that the result of following the Jewell-LaSalle decision here would be such "as retroactively to impose copyright liability where it has never been acknowledged to exist before." These brief quotations suggest a plausible explanation of the surprising result reached by the majority, namely, the argument which was made by the cable system in this case that a holding of infringement would subject existing cable systems generally to retroactive liability of such aggregate magnitude as to destroy many of them.

It should be noted specifically that both the majority and dissenting opinions in the Supreme Court decision in Fortnightly, as well as the lower court decisions, took cognizance of the ongoing consideration by Congress of the copyright problem of cable retransmissions, in the context of the general revision of the copyright law, and suggested that the problem in its complex and varied aspects called for resolution by Congress in the manner permitted by the flexibility of legislative improvisation. (We have already seen the same thought echoed in the Court of Claims decision in Williams and Wilkins.)

A few years later, in 1974, another case involving the copyright liability of CATV systems was before the Supreme Court. In this case, Teleprompter Corp. v. CBS, 415 U.S. 394, the cable system, using microwave relay equipment, brought to its subscribers the signals of far distant broadcast stations that could not have been intended to be received by them. (We leave aside the other issues in this case that are not relevant here.) The District Court in which this case began held (CBS v. Teleprompter, 355 F. Supp. 618, S.D.N.Y 1972) that the Supreme Court decision in Fortnightly applied here; it considered the function of the cable system in importing distant signals to be no different in essential character from the function of the system in the Fortnightly case as analyzed by

the Supreme Court. The Circuit Court of Appeals held otherwise (476 F. 2d 338, 2d Cir. 1973); it thought that the Fortnightly decision of the Supreme Court established the governing rule where the CATV served to bring the signals of a local broadcasting station to persons in the adjacent community who were prevented from receiving them directly only because of topographical conditions. When the CATV imported distant signals, the Circuit Court held, it did more than merely providing an antenna service; it brought the broadcast programs to a new audience that could not have received them even with an advanced antenna such as CATV used in the community, and in doing this it was "functionally equivalent to a broadcaster and thus should be deemed to 'perform' the programming distributed to subscribers on these imported signals."

The Supreme Court, in its majority opinion, agreed with the District Court's view that its ruling in the Fortnightly case applied to the CATV importation of distant signals since, it thought, the function of the CATV in providing viewers with the means of receiving broadcast signals is essentially the same. The majority opinion also rejected the argument that copyright liability should be imposed upon the importation of distant signals because the CATV was thereby diluting the value of the copyright owner's market for licensing broadcasts by stations in the area to which the distant signals were imported.

Three Justices dissented strongly, two of them not having participated in the Fortnightly decision. The dissenters indicated that they thought the Fortnightly decision itself was wrong, but that, accepting that decision now, the importation of distant signals presented a different case in which the CATV was functionally equivalent to a broadcaster. In one of the two dissenting opinions, by Justice Douglas with the concurrence of Chief Justice Burger, it was said:

> "The Copyright Act...gives the owner of a copyright 'the exclusive right' to present the creation 'in public for profit' and to control the manner or method by which it is 'reproduced. A CATV that builds an antenna to pick up telecasts in Area B and then transmits it by cable to Area A is reproducing the copyright work not pursuant to a license from the owner of the copyright but by theft. That is not 'encouragement to the production of literary (or artistic) works of lasting benefit to the world' that we extolled in Mazer v. Stein...
>
> "...Rechanneling by CATV of the pirated programs robs the copyright owner of his chance for monetary reward through advertising rates on rebroadcasts in the distant area and gives those monetary rewards to the group that has pirated the copyright."

Again in the several opinions in the Teleprompter case, as in Fortnightly, the courts called for Congressional action as the way to resolve the complex issues of cable TV transmissions of broadcast programs. As the Circuit Court of Appeals put it:

> "The complex problems represented by the issues in this case are not readily amenable to judicial resolution... We hope that the Congress will in due course legislate a fuller and more flexible accommodation of competing copyright, anti-trust, and communications policy considerations, consistent with the challenge of modern CATV technology."

What we see reflected in these disparate decisions in the Fortnightly and Teleprompter cases is, first of all, the realization that the basic issue of the copyright liability of cable systems for their transmission of broadcast programs cannot be resolved satisfactorily by the simple yes-or-no answer of a judicial decision, but requires a multi-faceted formulation that can be molded only through the legislative process. Further, inasmuch as the courts must decide particular cases presented to them in the meantime, we see a conflict among the judges between the desire to extend the principles of the copyright law as it exists so as to give the copyright owners the benefit of the economic value of their works as used in a new medium, and the desire to promote the development and growth of the new medium for the benefit of the public by shielding it from the heavy burden that would be imposed by holding it fully and retroactively liable for copyright infringement.

A.2.6.1 The Copyright Act of 1976. As we have already noted, bills for the general revision of the copyright law, including proposed provisions on the CATV problem, were under consideration by Congress during the time that the Fortnightly and Teleprompter cases were making their way through the courts. The controversy over the CATV issue was so intense that when the revision bill first reported out by the House Judiciary Committee was debated by the full House in 1967, the opposition to the CATV provisions was strong enough to force the proponents of the bill to agree to deleting the entire section dealing specially with CATV transmissions, and the bill was passed by the House without any resolution of the issue. For several years thereafter the revision bill languished in the Senate, mainly because of the intractable dispute over the CATV issue.

We will not tract the twists and turns taken in the provisions of the successive revision bills dealing with the CATV problem; they were changed substantially from the version in the bill of one year to the bill of the next. Nor will we recount the series of regulations proposed and issued by the FCC to control the carriage of broadcasts by

cable systems or the steps by which the interested parties -- copyright owners, CATV operators, and broadcasters -- ultimately reached agreements on the essential points of a legislative solution. What finally emerged was a complex and highly detailed set of provisions in section 111 of the revision bill based on two main premises: That commercial cable systems should have a compulsory license for those retransmissions of broadcasts that were authorized by the Federal Communications Commission, and that they should pay copyright royalties in a lump sum under a formula fixed initially in the statute. Omitting many of the details in the complicated structure of section 111, the Copyright Act of 1976 provides in main substance that:

-- A cable system may obtain a compulsory license to retransmit the broadcasts of those stations whose signals the system is authorized to carry by the FCC. It obtains the license by filing certain pertinent information in the Copyright Office.

-- A cable system will be fully liable for copyright infringement if it willfully or repeatedly retransmits the signals of a broadcast station that the FCC has not authorized it to carry, or if it willfully alters the content of a broadcast program or the accompanying commercial advertising.

-- Under the compulsory license the cable system must deposit semiannually with the Register of Copyrights a statement of account giving the specified information needed to determine the sum it is required to pay as the royalty fee for the preceding six months. The royalty fee is computed on the basis of specified percentages of the gross receipts of the cable system from its subscribers for its retransmission service; the percentages are fixed on a sliding scale according to the number and character of distant stations whose nonnetwork programs are imported by the cable system, with a special fee schedule provided for smaller systems.

-- The aggregated royalty fees are to be distributed, as determined by the Copyright Royalty Tribunal (established under sections 801-810 of the Act), among the copyright owners who file claims for their works that were included in the nonnetwork programs of distant broadcast stations carried by the cable systems. The Copyright Royalty Tribunal is also authorized to review and adjust the royalty rates from time to time under standards stated in the Act.

A.2.7 MICROFILM, VIDEOTAPE, AND COMPUTER PROGRAMS

When the Copyright Office first received, as a deposit for copyright registration, copyrightable textual material on microfilm, it had to make a decision on what appeared, at least at first glance, to be a doubtful question: In view of the 1908 decision of the Supreme Court in the White-Smith case -- holding that a "copy" of a work had to be visually perceptible -- could microfilm reproductions of a work qualify as the "copies" required by the 1909 statute to be deposited for registration? The effect of the White-Smith ruling had been avoided in subsequent legislation and court decisions dealing with sound recordings, but the ruling itself had never been overturned.

The work could not, of course, be read from the microfilm with the naked eye. It could, however, be made plainly visible and readable by placing the microfilm in a reader, a device that magnified the text in the microfilm. On this ground the Copyright Office decided that the White-Smith ruling on piano rolls of music, which could not have made the music visually perceptible by any means and was not intended to do so, did not preclude its acceptance as a "copy," of a microfilm from which the textual work was intended to be, and could be, made visually readable with the aid of a device readily available for that purpose.

The Copyright Office was presented with the same question again when it first received, for copyright registration, a motion picture produced on videotape. Nothing could be seen on the videotape itself, but when used in a projector designed for the purpose the videotape would reproduce plainly the visual images constituting the motion picture. Following its reasoning with respect to copyrightable text on microfilm, the Copyright Office concluded that it would accept videotape recordings as deposit "copies" of motion pictures for purposes of copyright registration.

The Copyright Office was faced once more with a similar question when it was asked to register copyright claims in computer programs embodied in magnetic tape. On the preliminary question of whether the program itself, consisting of a series of instructions by which a computer could be made to operate as directed, was a copyrightable work, the Copyright Office took the position, in substance, that if the instructions would constitute a copyrightable work if printed in the form of a book, they would be copyrightable in the form of a computer program. The question remained of whether the program in the form of punched card or magnetic tape, from which the instructions could not be read, was acceptable for copyright registration in view of the White-Smith ruling. The Copyright Office concluded that its reasoning with respect to microfilms and

videotape should be extended to the punched cards or magnetic tape bearing the copyrightable program, since the copyrightable series of instructions could be made readable by the human eye in the printout or projection from the computer. It may be noted that the Copyright Office announced its conclusions regarding the acceptance of computer programs for copyright registration in a circular (No. 61, issued initially in 1964) expressing some doubt about its conclusions in the absence of any court ruling on the precise questions involved, and stating that it would require the deposit of a printout or other readable form of the program, in addition to copies of the form in which the program was published, in order to identify the copyrighted content of the program.

The foregoing account illustrates how the Copyright Office may play a role in the adaptation of the copyright law to new technologies. Its conclusions concerning the copyrightability and registrability of works embodied in microfilms, videotapes, punched cards or magnetic tape have not been tested in the courts but have generally been accepted and followed in practice by the groups concerned.

The new Copyright Act of 1976 removes any lingering doubt as to copyright protection or registrability of works embodied in forms which the work is not visually perceptible but from which it can be made perceptible by the use of a machine or device. As we have noted earlier, the new Act, in section 101, defines "copies" as meaning:

> "material objects...in which a work is fixed by any method now known or later developed, and from which the work can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device."

A.3 PROVIDING TECHNOLOGICAL EXPERTISE TO THE JUDICIARY

The following discussion is responsive to the task as stated in these terms:

> "Discuss the utility of institutionalizing, by any appropriate new means, the provision of technological expertise to the judiciary with specific application to copyright litigation."

It is inherent in our judicial system that the courts may be called upon to render judgment in an infinite variety of cases involving some element of technology based on the various physical and social sciences. Thus, in particular cases the court may need to be informed, on an ad hoc basis, of the fundamental theories and operating principles and mechanisms of a scientific technology involved in the issues it must decide.

Over the years procedures have been instituted whereby such information, to the extent considered necessary, is furnished to the courts. It is characteristic of the adversary process in our judicial system that the parties to litigation are expected, through their counsel, to present testimony to the court -- including testimony by experts in a specialized field of knowledge where necessary -- explaining the salient facts in the case, the issues they raise, and the rationale advanced for the proposed decision. Witnesses offered as experts in a particular field of knowledge are required to be qualified as such, and their examination and cross-examination, including questioning by the judge, are expected to elicit the technical intelligence needed by the court to render an informed decision. Also, in the course of a trial or hearing, the court may be given a physical demonstration of the operation of a technological device or process.

Courts are also given memoranda and briefs prepared for counsel for the parties, which purport to explain fully and persuasively the factual data -- including the technical information considered pertinent --, as well as the legal analysis and arguments, that make up the case for each party. And the court, if it feels the need for further information, may call for the submission of additional memoranda or briefs on specified subjects. In cases of general importance the courts often receive informative memoranda and briefs also from interested persons or organizations other than the parties to the case. And, of course, judges may gain the information they need through their own research or through research conducted for them by their aides.

The procedures mentioned above comprise those most generally used to inform the courts of the facts and issues that must be known to them as the bases for their judgments, and those procedures have apparently been found adequate for the purpose in most litigation, including the usual run of copyright cases in which such technologies as may be involved are old and so well known as to be taken for granted.

If, in extraordinary cases, other means are needed to provide technological expertise to the judiciary, there are several prototypes that might be adapted to serve that need. Thus, in a few areas of the law where the cases involve technical questions of a specialized character, special courts have been established to decide controversial issues: for example, there is a special Court of Customs and Patent Appeals for the review of contested rulings by the Patent Office on the validity of patent claims, as well as rulings by the Customs Bureau on customs matters; and a special Tax Court has been established to decide cases involving liability for Federal taxes. Special courts have also been established in the States to deal with certain classes of social problems, notably juvenile and domestic relations courts. Judges of these special courts are expected to be or to become experts in the particular field within their jurisdiction.

Another means that might be employed to provide the courts with expertise in scientific or other technical fields is to have specialists in those fields attached to the staff of the court or otherwise serving as consultants to one or a group of courts on a regular basis. As an instance of this, many juvenile and domestic relations courts and some criminal courts have specialists, such as physicians, psychologists, and social workers, serving as members of their staff or as consultants to conduct examinations or investigations and advise the judges. It may not be practicable to staff the Federal courts with experts in the various branches of science and technology, but perhaps they could be called in as consultants as and when needed.

The evolution of regulatory and similar administrative agencies of the Government also suggests ways that might be developed to provide the courts with technical information. Those agencies are somewhat comparable to courts in that they exercise quasi-judicial functions in interpreting the broad provisions of statutes and applying them to specific situations. To assist in their performance of these functions the agencies employ specialists in various fields to assemble information on technical subjects and to evaluate the significance of that information for the guidance of the agency in making decisions. It might be feasible to make arrangements whereby the expertise of the various Government agencies could be made available to the courts in a regularized manner.

Are special institutions or procedures such as those mentioned above needed in copyright litigation involving new technologies for the production or use of copyrighted works? This comes down to a matter of opinion on which analysts of the question may differ. We believe the answer is: no. As we see it, the judicial decisions in copyright cases, as exemplified by those reviewed earlier in this study -- (and they are more concerned with technological aspects than are the bulk of copyright cases) --, indicate that the courts have been adequately informed, through the judicial processes and procedures now used, on the new technologies involved, to enable them to reach intelligent and appropriate judgments.

It is evident that patent law, for example, deals essentially with products and processes of the physical sciences and technology, so that a fairly thorough knowledge of those fields is required in deciding many of the questions that arise under the patent law. But the copyright law is quite different in the nature of its subject matter -- works of authorship -- and in its central concerns with the reproduction and dissemination of such works; the technologies involved in the means of reproduction and dissemination appear to be no more than incidental to the main issues which relate to the economic and social values of such works and their uses. So, it is generally enough, in copyright cases, for the court to be informed of the basic features of the technologies involved; the court does not need to acquire the detailed knowledge in depth of an expert in the technology.

This last observation is well illustrated by the Fortnightly case: The District Court devoted twelve pages of its opinion to a detailed exposition on the technological processes involved in the cable system's retransmission of broadcast signals, as throwing light on the question of whether the cable system merely relayed those signals or transformed them into new signals constituting a new performance of the content of the program (though this was not the sole basis for the District Court's decision). Both the Circuit Court of Appeals and the Supreme Court disavowed this technological analysis as a basis for deciding the issue; instead, they looked at the functional purpose and effect of the retransmission to decide whether it was a performance comparable to that of a broadcaster (as the Circuit Court held) or was merely a passive aid to the viewer's reception of the broadcast (as the Supreme Court held).

Commentators have criticized some court decisions in one copyright case or another as reflecting the court's lack of understanding of certain principles of the copyright law; but it would be hard to find any complaints that the courts have reached erroneous conclusions because they did not understand the technologies involved in the use of copyrighted works.

In sum, as we see it, the technology employed in the reproduction or dissemination of copyrighted works would rarely, if ever, be decisive of the issues in copyright cases, and the means now used to bring the pertinent facts of a case to the attention of the court are adequate to provide the court with as much information as it needs concerning the technologies involved.

A.4 THE COPYRIGHT LAW IN RELATION TO COMPUTERIZED INFORMATION SYSTEMS

A.4.1 BACKGROUND

A.4.1.1 Legislative History. During the initial hearings in the House of Representatives in 1965 on the bill for general revision of the copyright law, some sketchy testimony was presented on the problems then anticipated concerning the use of copyrighted works in computer systems (Hearings on H.R. 4347, 89th Cong.). In its Report in 1967 based on those hearings (House Report No. 83, 90th Cong.) the House Judiciary Committee said:

> "Although it was touched on rather lightly at the hearings, the problem of computer uses of copyrighted material has attracted increasing attention and controversy in recent months. Recognizing the profound impact that information storage and retrieval devices seem destined to have on authorship, communications, and human life itself, the committee is also aware of the dangers of legislating prematurely in this area of exploding technology."

Even while it spoke of legislating prematurely, the Committee went on to express these opinions:

> "Thus, unless the doctrine of fair use were applicable, the following computer uses could be infringements of copyright under section 106: reproduction of a work (or a substantial part of it) in any tangible form (paper, punch cards, magnetic tape, etc.) for input into an information storage and retrieval system; reproduction of a work or substantial parts of it, in copies as the "print-out" or output of the computer; preparation for input of an index or abstract of the work so complete and detailed that it would be considered a "derivative work"; computer transmission or display of a visual image of a work to one or more members of the public. On the other hand, since the mere scanning or manipulation of the contents of a work within a system would not involve a reproduction, the preparation of a derivative work, or a public distribution, performance, or display, it would be outside the scope of the legislation."

These problems of computer uses of copyrighted works were discussed thereafter at much greater length during the Senate hearings in 1967 on

the general revision bill (Hearings on S. 597, 90th Cong.). The testimony at those hearings on behalf of authors and publishers generally argued in support of the opinions stated in the House Committee Report (No. 83). The testimony on behalf of user groups, especially academic users, was critical of those opinions; suggested that some uses of copyrighted material in computer systems should be exempt from copyright control, and insisted that it was premature to reach any legislative conclusions on the issues. There were suggestions by some witnesses on both sides that many of the controversial aspects of the problem could be resolved if a central "clearinghouse" system could be established to license computer uses of copyrighted works on a mass basis upon payment of preestablished royalties.

Subsequently a consensus developed among the interested groups that the problems of computer use required further study before they could be dealt with satisfactorily in legislation. Two legislative provisions emerged from that consensus. One was the provision to establish the National Commission on New Technological Uses of Copyrighted Works (CONTU) which was enacted on December 31, 1974 as part of Public Law 93-573. This act states:

> "The purpose of the Commission is to study and compile data on:
>
> (1) the reproduction and use of copyrighted works of authorship --
>
> (A) in conjunction with automatic systems capable of storing, processing, retrieving, and transferring information, and
>
> (B) by various forms of machine reproduction...
>
> (2) the creation of new works by the application or intervention of such automatic systems or machine reproduction."

The Commission is to make a final report within three years (by December 31, 1977) with its recommendations as to "such changes in copyright law or procedures that may be necessary to assure for such purposes access to copyrighted works, and to provide recognition of the rights of copyright owners."

The second provision resulting from the consensus among the parties concerned was section 117 of the new Copyright Act of 1976, providing in substance that the law pertaining to computer uses of copyrighted works

in effect on December 31, 1977 (the day before the new Act becomes effective) would continue to be in effect under the new Act. Section 117 states that the new Act --

> "does not afford to the owner of copyright in a work any greater or lesser rights with respect to the use of the work in conjunction with automatic systems capable of storing, processing, retrieving, or transferring information, or in conjunction with any similar device, machine, or process, than those afforded to works under the law, whether title 17 or the common law or statutes of a State, in effect on December 31, 1977, as held applicable and construed by a court in an action brought under this title."

What the applicable law now in effect may be is uncertain, but it appears to be unlikely that any major issue of computer use of copyrighted works will require a decision in the very near future.

A.4.1.2 Interested Groups. The wide range of interest groups having a financial, professional, or service interest in the generation, dissemination or use of scientific and technical information that might be used in computerized systems is reflected in the list of persons and organizations by or for whom testimony was presented on the issues of computer uses, or whose interests were referred to, during the Congressional hearings on the copyright revision bills. The interest groups identified in those hearings and in other literature on the subject include:

- -- Authors of textual, graphic, and other kinds of works in the various field of science and technology.
- -- Commercial publishers and nonprofit publishers (such as scientific societies) of journals in the various fields of science and technology. These journals appear to be the copyrighted works most used in scientific and technical research.
- -- Commercial publishers and nonprofit publishers (such as university presses) of books, monographs, graphic and other materials of a scholarly or informational character. Included here would be the publishers of cyclopedic works and educational materials.
- -- Producers and publishers of compilations of bibliographic and factual data.
- -- Libraries, especially large research, university, and industrial libraries.

-- Educators and students, especially at the college and university levels.

-- Industrial and nonprofit research organizations and individual researchers, including professional practitioners and societies, in the various fields of science and technology.

-- Producers of computer hardware and software.

-- Organizers and operators of computerized information service systems.

-- Commercial indexing and data search services.

-- Other specialists in computer and information technologies.

These groupings could, of course, be arranged in many other ways, and there is considerable overlap among the groups as listed above. For example, educators or researchers may also be authors; some journal publishers also publish compilations of data; and a future may be envisioned in which publishers or libraries are also the operators of computerized information service systems.

A.4.2 SCOPE OF THIS SECTION

A.4.2.1 Computer Programs. We have referred above, in section A.2.7 of this report, to the availability of copyright protection for computer programs. The broad question of protection for computer programs was not intended to be a primary subject of this report; but it is tangential to some of our main subjects; and we will supplement the earlier reference to their copyrightability with a brief review below, in section A.4.3, of the extent of protection afforded to computer programs by copyright. Because, as we shall see, copyright protection is limited essentially to copying the program as written, broader protection under patent principles, extending to the process or algorithm embodied in the program, has been advocated by some parties but has been opposed by others. The issues of protecting computer programs under patent principles, or by contracts based on the law of trade secrets which some program producers have relied upon, are completely outside the scope of this report.

A.4.2.2 Data Bases. The much-heralded "information explosion" -- the massive proliferation of published material during the last few decades -- has greatly emphasized the need of scientific and technical

researchers for two capabilities; first, they must be enabled to learn of, and to segregate from the steadily growing flood of published material, principally journals, those particular articles that appear to be pertinent to their fields of research and to their current inquiries; and second, having identified the articles that appear to be pertinent, they must be enabled to obtain copies of those articles for study.

The conventional effort to meet the first need -- identifying the pertinent articles -- has been to compile and publish in printed form various kinds of bibliographic indexes and abstracts of the mass of published articles. These bibliographic publications have been indispensable research tools; but even in any one specialized field, a researcher seeking comprehensive coverage of the pertinent sources would need to review a number of indexes and collections of abstracts, which he would generally not be able to do efficiently and might often not be able to do at all, because of the high cost of acquiring all or most of the relevant bibliographic publications, and because it would take too large a portion of his working time to review all of the accessible bibliographic publications and identify the articles of interest to him.

Computer technology has offered a means of solving this problem. Bibliographic indexes and abstracts can be prepared or reproduced in the form of machine-readable data bases and placed in computerized information systems. Such computerized systems make it possible for a researcher to find and select, quickly and with a high degree of accuracy, from the mass of articles indexed and abstracted in the data bases, those which appear to pertain to the particular subject of his research. A large assemblage of data bases, coupled with a modern telecommunication system and available terminals, can enable researchers located at a distance to make a fairly comprehensive search, in a very short time, of the published articles in their specialized fields.

Several such data base systems are now in operation and some of them include copyrighted data bases leased by the system from the copyright owners. Data base systems of this character present prime examples of computerized information systems using copyrighted material. Many of the copyright questions that are seen as likely to arise in connection with the use of copyrighted material in computer systems can be posed in the context of data base systems. Those questions will be considered in relation to data base systems in section A.4.4 of this report.

A.4.2.3 Supplying Copyrighted Documents. The second of the researcher's needs -- to obtain the full text of the articles he finds pertinent --

presents a different situation. Even though the costs of computer storage of textual materials can be expected to be reduced very substantially over the next decade or two, the cost of full-text computer storage might still be extremely high as compared with other effective means of storing a library of many articles from which copies could be provided as needed. Such other methods would include, for example, the storage of articles in microform from which reproductions (either in microform or in printed pages) could be supplied readily and at small cost by mail.

It seems highly probable that the supplying of copies of journal articles as needed by researchers will continue, for a long time to come, to be a function primarily of the publishers or their licensees. Several commercial organizations, operating under licenses from a large number of publishers, are now in the business of supplying copies of documents on order. A few of these organizations provide a data base search service, and supply copies of documents in conjunction with that service. Such arrangements will probably expand.

Insofar as publishers and their licensees do not fulfill the function of supplying copies of documents adequately and expeditiously, libraries will no doubt continue to be called upon to supply "photocopies". (Perhaps a library maintaining a large collection of journals will be an adjunct to a computerized data base system.) In that case, the copyright questions relating to the supplying of copies of articles to researchers will be those pertaining to library photocopying. We have already referred briefly to the copyright aspects of library photocopying in section A.2.5 of this report. Further consideration of that subject is beyond the scope of this report, except for the related matter (which pertains also to computer storage and retrieval of copyrighted works) of the possibility of establishing central clearinghouses for the mass licensing of copyrighted works for reproduction. The subject of clearinghouses will be considered in section A.4.6 of this report.

As indicated above, it does not seem likely that computer storage of any large mass of documents will be common in the foreseeable future. However, there have been a number of instances of full-text input of copyrighted works into computers for various purposes such as analysis or indexing of the work, or reproduction of all or parts of the work for review. And there are a few instances of computer storage for retrieval of a fairly large volume of documentary material. Some computerized law research services, for example, contain the full text of many statutes and court decisions (which, it may be noted, incidentally, are not subject to copyright) together with related notes, abstracts, and commentaries (which may be subject to copyright).

We shall assume that full-text input of some kinds of copyrighted material will become more common eventually. As previously mentioned, many of the copyright questions that might arise in connection with full-text storage of copyrighted works will be similar to those that will be discussed in the context of data base systems in section A.4.4 below. The questions that we see pertaining specially to full-text storage and retrieval will be reviewed in section A.4.5.

A.4.3 COPYRIGHT PROTECTION FOR COMPUTER PROGRAMS

As we have noted earlier, in section A.2.7 of this report, computer programs (i.e., the series of instructions which are considered to constitute a literary work) are subject to copyright protection. The doubt that was previously expressed about their copyrightability (stemming from the fact that in the machine-readable form in which programs are distributed they are not visually perceptible) has been removed by the new Copyright Act of 1976, especially by section 102(a) which reads:

> "Copyright protection subsists, in accordance with this title, in original works of authorship fixed in any tangible medium of expression, now known or later developed, from which they can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device."

The protection afforded to computer programs by copyright, however, is limited. The exclusive rights of a copyright owner to "copy" and "publish" his work, as provided in section 1 of the 1909 Copyright Act still in effect, would apply to computer programs. These same rights are embraced by the provisions in section 6 of the new 1976 Act giving the copyright owner the exclusive rights to "reproduce the copyrighted work in copies" and to "distribute copies ... of the copyrighted work to the public."

What constitutes "copying" or "reproduction" may be a matter of fine distinctions. Infringing reproduction would, of course, include full, literal copying of the work as written, but it is not confined to this. Copying of a substantial and material part of a work would be an infringement, and so would copying with slight changes. Tracking of the substance and sequence of the steps set forth in a program may constitute infringement, even though many superficial changes are made (as in an effort to disguise the fact of copying).

On the other hand, it is a basic principle of copyright law that the ideas or concepts embodied in a work, even if they are original with

the author, are not protected against use in the independent work of another author. In other words, it is only the author's original "expression" or exposition that is protected against copying. Copyright does not preclude others from using the know-how they learn from a copyrighted work in their own works. Thus, in the case of computer programs, copyright would not protect the processes or techniques developed to make the program operative and revealed in the program. This is reflected in the provision in section 102(b) of the new 1976 Act reading:

> "In no case does copyright protection for an original work of authorship extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied in such work."

The protection afforded by copyright against reproduction may be of little or no significance with respect to programs designed specially for a particular user. Such protection may be quite valuable, however, for a program that would have a market of many users and could be reproduced cheaply in the absence of copyright.

A.4.4 DATA BASE SYSTEMS

A.4.4.1 Copyright Protection for Data Bases

A.4.4.1.1 Copyrightability. Data bases are compilations of data consisting typically of bibliographic indexes -- words and phrases identifying the subject content of published documents -- and abstracts of documents describing their subject content more fully. Data bases may also consist of compilations of factual data such as mathematical or scientific formulas or statistical tables. Compilations of various kinds of data are traditional subjects of copyright protection. Both the Copyright Act of 1909 (in sections 5(a) and 7) and the new Act of 1976 (in section 103) mention compilations explicitly as a category of copyrightable works. In section 101 of the Act of 1976 a "compilation" is defined as "a work formed by the collection and assembling of preexisting materials or of data that are selected, coordinated, or arranged in such a way that the resulting work as a whole constitutes an original work of authorship."

As reflected in this definition, the authorship that makes a compilation copyrightable lies in the labor, skill, and judgment involved in

selecting the pertinent data and organizing and arranging the mass of selected data into a systematic and useful whole. Thus, while the individual items in a compilation are not subject to copyright in themselves, the collection as a whole, or any segment of it large enough to be the product of selection and organization by the author, would be protected by the copyright against unauthorized reproduction.

Compilations of various kinds of data -- including bibliographic indexes and abstracts -- are well known as printed publications and have generally been copyrighted in that form. A number of them are now being issued also in machine-readable copies and this trend seems to be growing. It is now possible also to compile indexes and other data by the use of computers, and there is no apparent reason why a data base so compiled, in machine-readable form, would not be copyrightable.

As reported in the February 1977 issue of Information Action (a publication of the Information Industry Association): "the number of data bases available for on-line access has doubled in the last year... In 1965, 24 machine-readable, bibliographic data bases covering 880,000 documents existed. In 1975, the total was over 160 covering 46 million documents."

Many of the existing data bases are covered by copyright but others are not. Several of them have been produced by the U.S. Government and are therefore not copyrightable. Some producers of data bases apparently rely upon their contractual arrangements with the systems to which their data bases are leased for protection of their proprietary rights.

A.4.4.1.2 Copyright Notice on Data Bases. In order to maintain copyright protection, the published copies of a work are required by the statute to bear a notice of copyright in a prescribed form, "affixed to the copies in such manner and location as to give reasonable notice of the claim of copyright" (Act of 1976, section 401). Some commentators have anticipated difficulty in meeting this requirement in the case of machine-readable copies such as magnetic tapes. Their concern on this score may have been due in large part to the less flexible language of the notice provisions in the 1909 statute (section 20) which was phrased in terms of printed publications. In any event, we see no real difficulty in affixing the required notice to the magnetic tapes (or other machine-readable copies). The notice could be incorporated in the system software so that it would appear in any printout. And even assuming that an eye-readable notice should be affixed to the tape copies, it seems reasonable to expect the tape copies, or a container in which they are housed, to bear an eye-readable

label showing the title which identifies the work on the tape; the copyright notice could readily be placed on that label. It might be added that any special problems regarding the placement of the notice on tape copies could be resolved under the Act of 1976 by the Register of Copyrights who is authorized (by Section 401(c)) to prescribe "specific methods of affixation and positions of the notice on various types of works that will satisfy this requirement."

A similar problem concerning the copyright notice occurs when some part of a data base is printed out from a computerized system in response to a user's inquiry. It is not clear whether the notice would be necessary on each reproduction of a relatively small number of items in a data base. It is arguable, we believe, that the reproduction of a small part of the collected data is not such a published copy of the work as would call for the notice; and this argument would be more cogent where the subscribers to the computer system's service were informed in advance that certain of its data bases were copyrighted. If it is thought to be necessary or advisable to have the notice appear on each printout of any part of a data base, this appears to be feasible. The data base would normally be identified by its title in the printout, and the computer could be programmed to include the copyright notice in every printout of the title.

A.4.4.1.3 Deposit of Copies for Registration. Registration of a copyright may be essential to its effective enforcement against infringers. Under the Act of 1909, registration is a prerequisite to maintaining a suit for infringement (section 13) and it facilitates proof of the validity of the copyright claim (section 209). The 1976 Act has provisions to the same effect (sections 411 and 410(d)), and provides in addition that awards of statutory damages and attorney's fees (special remedies that make enforcement of the copyright more effective) are to be granted only when registration has been made (section 412).

To make registration, the deposit of two copies of the work as published is required under both the 1909 Act (section 13) and the 1976 Act (section 408(b)). That requirement has been met readily for printed compilations of data, and printed copies would apparently suffice for deposit where the compilation has also been produced as a data base in machine-readable form. But if a data base were prepared only in machine-readable form, the deposit of copies could be troublesome, or at least burdensome, if, as the 1909 Act has been thought to require, the copies deposited had to be visually perceptible. The resolution of this problem has been made possible by the provisions in the Act of 1976 (section 408(c) reading --

"The Register of Copyrights is authorized to specify by regulation the administrative classes into which works are to be placed for purposes of deposit and registration, and the nature of the copies or phonorecords to be deposited in the various classes specified. The regulations may require or permit, for particular classes, the deposit of identifying material instead of copies or phonorecords..."

A.4.4.1.4 Supplements to Update Data Bases. Bibliographic data bases must be brought up to date from time to time by adding to them new index entries and citations for more recently published articles. Some observers have seen difficulties in complying with the requirement for deposit of copies with respect to such supplemental additions. Printed publications with supplements issued serially, such as loose-leaf information services, are well known. The usual procedure for them has been to publish each supplemental issue as a new work in itself with its own copyright notice, and to deposit copies of each supplemental issue for registration as a separate work. Alternatively, an entire new edition of the work as revised to include the supplemental additions could be published, and copies of the new edition could then be deposited. Either of these procedures would seem to be feasible for supplements compiled periodically for addition to a data base, though the latter procedure of publishing an entire new edition may be expensive.

It might be noted also that when supplemental items are merged into a computer-stored data base, coverage of the new material by copyright might require changing the year date in the copyright notice appearing with the data base in its earlier form. But even if the notice is left unchanged, copyright protection of the content of the data base in that earlier form would not be affected, and this may be adequate protection for all practical purposes as long as the newly added material could not be used without some of the earlier material. When the volume of new material added by updating over a long period of time becomes a major part of the entire data base, reissue of the data base in a new edition might be found appropriate.

A.4.4.2 Compiling Data Bases

A.4.4.2.1 Bibliographic Indexes. The process of compiling bibliographic indexes involves the following steps: obtaining copies of the documents to be included in the index, scanning those documents and selecting from them the key words and phrases to be listed in the index as subject headings, perhaps inserting other subject headings judged

by the compiler to be needed as cross-references, and arranging the subject headings together with citations to the documents in an alphabetical or other orderly arrangement. Traditionally, this process has been, and generally still is, performed manually through the exercise of human effort and skill, and the completed index is published in printed form.

It is now possible to perform this process and prepare an index of some quality by using a properly programmed computer, but with this difference: The documents to be indexed must be in machine-readable form to be processed by the computer.

As long as the indexer uses authorized copies of copyrighted documents, there is ordinarily no copyright problem in the manual compilation of a bibliographic index. Scanning of the copies, the extraction of key words and phrases as subject headings, and the arrangement of those headings with citations to the documents, do not constitute infringement of the copyright. No copy of the substance of the document is made in this process, nor would the resulting index be considered an infringing copy or derivative work since it would not convey the essence or meaning of the work embodied in the document.

Similarly, if a machine-readable copy of a copyrighted document used for indexing by a computer was obtained from the publisher,* preparation of the index by the computer would seem to involve no infringing act. A publisher who supplies a machine-readable copy of a work to a computer operator would impliedly authorize the use for which it was intended: Its input into the computer. The subsequent processing of the document by the computer in indexing it would be the same in character as the processing done in manual indexing, which, as pointed out in the preceding paragraph, would not involve any infringement of the copyright.

When a machine-readable copy is made available by the publisher, it would seem reasonable to expect the computer operator to acquire such a copy for his machine indexing. But if, instead, he chose to make his own machine-readable copy (which would seem to be unlikely since making

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* The references made here and below to the publisher as the supplier of copyrighted material assume that he is the copyright owner or the agent of the copyright owner.

his own would usually cost more than obtaining one from the publisher), he would then be making a reproduction of the document in apparent violation of the copyright owner's exclusive right to "reproduce the copyrighted work in copies" (Act of 1976, section 106 (1)).

If a machine-readable copy is not made available by the publisher of a copyrighted document, an indexer would appear to be unable to use a computer in indexing that document unless he obtained permission from the publisher to make and use a machine-readable copy. To seek permission from a large number of individual publishers could be a very time-consuming and costly procedure, so much so perhaps as to discourage computer indexing of any large number of documents. Some persons interested in fostering the development and use of computers have suggested that in this situation, the making of a machine-readable copy and its input into the computer for the sole purpose of preparing an index should not be regarded as an infringement but should be treated as a fair use. They argue that, as long as the publisher does not offer such copies, making one for a use which is not itself an infringement would not injure the copyright owner in any way and would not displace the potential sale of a copy of the work. In fact, they say, the inclusion of the work in the index would create some demand for copies. Alternatively, some of the same persons suggest, the statute should provide for a compulsory license to make and use a machine-readable copy in situations of this character.

A.4.4.2.2 Abstracts in Data Bases. Bibliographic data bases may include, in addition to index headings and citations, abstracts of the contents of the cited documents. These abstracts aid the researcher in determining more precisely the relevance to his subject of the documents cited in connection with the pertinent index headings. Typically, the abstracts in a data base are similar to a table of contents in that they are brief identifying statements of the subjects dealt with in the document. Such abstracts of copyrighted works do not reproduce the substance of the work and would not be a substitute for the work in conveying the essential information to be derived from reading the document itself. Accordingly, it would seem that such abstracts, like indexes, may be made freely without regard to the copyright in the work.

On the other hand there are so-called "abstracts" that are really synopses or digests of the substance of the document, conveying that substance so fully that a researcher's need for the information in the document might be satisfied by his reading of the "abstract" alone. This kind of synoptic abstract would seem to constitute a derivative work under the definition in section 101 of the Act of 1976 reading in part:

> "A 'derivative work' is a work based upon one or more pre-existing works, such as ... (an abridgement (or) condensation ..."

A person who makes an "abstract" amounting to a condensation of a copyrighted work infringes upon the exclusive right of the copyrightowner to "prepare derivative works based upon the copyrighted work" (Act of 1976, section 106 (2)).

It is evident that there will be difficulty in some borderline cases in determining whether a particular abstract would be considered a mere non-infringing identifier of the subjects covered in a document, or an infringing condensation of the document.

The author abstracts accompanying many copyrighted articles are often sufficiently full in themselves to be protected as a copyrighted component of the work, so that their unauthorized reproduction would infringe the copyright.

In sum, the compiler of a data base would risk being charged with copyright infringement if his data base included abstracts prepared by him that could be considered condensations of copyrighted works, or included author abstracts of some length.

A.4.4.3 Putting Copyrighted Data Bases into Computer Systems

A.4.4.3.1 Where Publishers Offer to Supply Machine-Readable Copies. As shown by the preceding examination of the operation of existing computerized information systems, machine-readable data bases are being produced by many of the publishers of the compiled indexes and abstracts making up the content of those data bases, and the computer systems obtain their data bases from the publishers. Under this established business practice, the rights of the system to use the data bases and supply information extracted from them to their subscribers, and the compensation to be paid to the publishers, are settled by the contracts between the parties. As such contracts become common, a standard pattern of terms and conditions, shaped by the industry needs and experience, can be expected to evolve. The recognized copyright problems that would otherwise be involved in the use of copyrighted data bases in computerized systems would generally be resolved by such contracts. Nor would these copyright problems arise in those instances where the computer systems are operated by the publishers themselves.

To be most effective, a bibliographic data base system should cover the literature in any particular field of information as comprehensively as possible. The rapid expansion of published information has been, and no doubt will continue to be, accompanied by a corresponding expansion in compiled indexes and abstracts. As computerized data base systems become more highly developed and more commonly used, the publishers of more of the printed compilations of bibliographic data will no doubt make them available in machine-readable form to meet the demand for their use in computerized systems. To the extent that this occurs, the copyright problems pertaining to the use of data bases in such systems will continue to be settled by contractual arrangements.

Where the publisher offers to supply a machine-readable copy of a copyrighted data base wanted by an operator for inclusion in his system, we suggest that the operator should be expected to obtain it from the publisher. For the operator to make his own machine-readable copy in that situation should constitute an infringement.

A.4.4.3.2 Where Publishers Do Not Offer Machine-Readable Copies. It may be supposed that instances will arise in the future when a large computerized information system, seeking comprehensive coverage of some field, will wish to include in its data bases certain copyrighted compilations of bibliographic data that have been published only in printed copies. No more than a few publishers would be involved at any particular time and the system operator could identify them readily. It would therefore seem reasonable in such cases to expect the system operator to deal directly with the individual publishers. The operator could ask the publisher to make and supply a machine-readable copy of the compilation for the operator's use under a contract, or, as an alternative, to grant permission to the system operator to make his own machine-readable copy for such use. It seems probable that one or the other of such requests would be acceded to by the publisher upon terms mutually agreed to.

But suppose further that the publisher refuses to accede to either request, or simply fails to respond to the system operator's inquiry. In light of the value for research of having comprehensive coverage in data base systems, there would seem to be a valid argument in favor of providing some kind of compulsory license to permit a system operator to make and use a machine-readable copy of a copyrighted compilation of data where the publisher refuses or fails to provide such a copy or to grant permission to the operator to make one for his own use, within a reasonable period of time after being requested to do so. Under the compulsory license, of course, the system operator would be required to pay equitable compensation to the publisher.

A.4.4.3.3 Where Third Persons Offer to Supply Machine-Readable Copies. A machine-readable copy of a copyrighted data base is not likely to be available to the operator of a computerized system from a source other than the publisher (or his agent). Publishers who supply machine-readable copies for use in such systems will normally not sell a copy to a system operator so as to give him ownership of it, but will lease it to him under an arrangement which expressly confines its use to that system and precludes its being made available to anyone else. This practice is necessary because of the so-called "first sale doctrine" which is well established in the copyright law. Under that doctrine, the copyright owner's control over the distribution of copies of his work ends, with respect to any particular copy, when he makes the first sale of that copy. The doctrine is reflected in section 109(a) of the Copyright Act of 1976 which reads:

> "...the owner of a particular copy or phonorecord lawfully made under this title, or any person authorized by such owner, is entitled, without the authority of the copyright owner, to sell or otherwise dispose of the possession of that copy of phonorecord."

How the "first sale doctrine" operates is best illustrated in the familiar setting of the sale of a copy of a book by the copyright owner. The purchaser of that copy becomes its owner. He is precluded by the copyright law from reproducing the work in other copies (either in its original form or in a derivative form) and from performing or displaying the work publicly (except as specially permitted by the copyright statute); but as the owner of the particular copy purchased, he is free to sell, lend, destroy, or otherwise dispose of that particular copy as he sees fit.

Machine-readable data bases have no use other than in computerized information systems, and the number of prospective customers for copies is limited. The publisher must therefore seek to prevent the system operator to whom he supplies a machine-readable copy from passing that copy on to another system operator. This is done by leasing copies under specified restrictions against allowing others to use them.

If leasing copies in this manner, rather than selling them, is known to be the usual practice, a system operator who is offered a machine-readable copy of a data base by another system operator, or by anyone other than the publisher, would have reason to be suspicious of the legitimacy of such offer. He would therefore be required to investigate the offeror's right to claim lawful ownership of the copy and to dispose of it, and he would subject himself to liability if he obtained the copy from an offeror who was acting in violation of the rights of the copyright owner.

Even assuming that a system operator could lawfully obtain a machine-readable data base for use in his system from someone other than the publisher, he would probably have little or nothing to gain from doing so. He would still need to input the data base into his system and to provide the output of material from the data base to the users of his system. It seems virtually certain that at some stage during these operations he would have to deal with the publisher to obtain a license for these uses of the data base. The terms of the license might well be much the same as if he had leased the data itself from the publisher.

A.4.4.3.4 Input of Data Base as Use Subject to Copyright. As we have observed above, in the usual case where the operator of a computerized information system obtains a machine-readable data base from the publisher, the copyright license he might need to use the data base in his system would no doubt be included in his lease agreement with the publisher. This would apparently be true also in the situation mentioned above where a system operator arranges with the publisher of a printed compilation of data to make his own machine-readable copy for use in his system.

There may be some special circumstances in which a system operator acquires a machine-readable copy of a copyrighted data base without having obtained a license for its use in his system. As an example of this unusual situation, we have mentioned above the possibility of an operator's acquiring a machine-readable data base from a person other than the publisher. The question would then arise as to whether the system operator should be required to obtain a license from the publisher before he puts the data base into his system or need only arrange thereafter to pay the publisher for output.

In the extended discussion of a similar question heretofore (in relation to full-text input of documents), it has generally been agreed that the copyright owner of works placed in and retrieved from computer systems should be entitled to compensaion for such use of his works. Differing views have been expressed, however, as to whether the copyright owner should be entitled to payment for input or only for output. The arguments advanced in the past discussion for free input have been concerned largely with the input of documents for experimental purposes during the developmental stages of computer systems, or for non-infringing purposes such as analyzing or indexing a work which do not entail any reproductive output of the work.

With regard to bibliographic data bases, the only purposes of their input into a computerized system is to make them available for output in pertinent portions in response to inquiries. Assuming that the copyright owner is entitled to payment, at some stage of the input-output process, for the use of his data base in the system, three considerations seem to us to be of prime importance:

(1) It is more practical for the parties concerned to agree upon the payment to be made, and the other conditions relating to the use of the data base in the system, before the process of use begins -- that is, before input. This would be true even if the amount to be paid were made dependent in part upon the volume of output. To defer negotiating the terms and conditions of use and payment until after the operator has incurred the trouble and expense of input could be awkward and perhaps abortive if the parties then find it difficult to reach an agreement.

(2) Where the data base is not obtained from the publisher, he would not be assured of learning of its use in the system, and would not be able to exercise any control over its use, unless the system operator is required to deal with him before input takes place.

(3) There may be room for dispute as to whether the output, which would ordinarily consist of no more than a fragment of the content of the data base, amounts to a fair use rather than an infringing reproduction of the work. (We shall have more to say about this later.)

These three considerations, among others, would seem to justify the conclusion that a license to use a copyrighted data base in a computer system should be negotiated before input.

A.4.4.4 Output from Data Base

A.4.4.4.1 Normal Output. The output of material from a data base in a computerized system may be in the form of a printout ("hard copy") or in the form of a display on a cathode ray tube (CRT). There was formerly some question as to whether a CRT display of copyrighted material would constitute an infringement of the copyright owner's exclusive right to make a "copy" of his work. But the new Copyright Act of 1976 provides, in section 106(5), that the public "display" of a work, such as would appear on a CRT, is among the exclusive rights of the copyright owner; and under the definition in section 101, a

display is made "publicly" if (among other things) it is transmitted "to the public, by means of any device or process, whether the members of the public capable of receiving the ... display receive it in the same place or in separate places and at the same time or at different times."

The output of material from a data base will usually consist, in each individual instance, of no more than a few of the great mass of index entries, citations, and abstracts making up the copyrighted compilation of data. As mentioned earlier, it may be contended that the extraction of a few such items from a data base is a fair use rather than an infringement of the copyright. To appraise this contention, the criteria of fair use as stated in section 107 of the Act of 1976 should be recalled:

> "In determining whether the use made of a work in any particular case is a fair use the factors to be considered shall include--
>
> (1) the purpose and character of the use, including whether such use is of a commercial nature or is for nonprofit educational purposes;
>
> (2) the nature of the copyrighted work;
>
> (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole; and
>
> (4) the effect of the use upon the potential market for or value of the copyrighted work."

It may be conceded that the taking of a few items from a data base by an individual researcher on any one occasion may meet the criteria of fair use. The posture of the system operator, however, appears to quite different in this regard. The operator is supplying many portions of the work, though each may be small in itself, to many persons; the aggregate is quite substantial. He does so for commercial purposes. The repeated use of the work in small portions is the normal use for which the work was intended. And finally, since such output fulfills the user's need for the work, it displaces what might otherwise be potential sales of copies of the work.

In sum, while the output of a small fragment of a data base on any one occasion would have the indicia of fair use, the aggregate of the output

of fragments on many occasions in the operation of a computerized system can be seen to constitute an infringing activity for which a license from the copyright owner should be required.

Here again, the matter of copyright infringement by the system operator will be set at rest where the operator contracts with the publisher for use of the data base in his system. It may be assumed that such a contract would cover output as well as input. In the lease agreements known to us for the use of data bases in computerized systems, provision is made for an initial payment to the publisher for the lease of the data base and additional periodic payments based upon the volume of output.

A.4.4.4.2 Extraction of Bulk of Data Base by User of System. A different question may arise in relation to the users who extract data base material from a computerized system. The system will ordinarily provide users with the capability of extracting as much of the material in a data base as they wish and are willing to pay for. It is conceivable that an individual user might take out an entire data base, or so much of it as to constitute an infringing reproduction usable as an abbreviated data base in itself. He might do so, for example, in order to have his own data base for his future use, or to supply a data base for use by others.

The act we are assuming here by the user may be characterized as a theft of the data base and is clearly an infringement of the copyright. The problems are practical ones: what can be done to prevent such a theft, and how can it be detected?

The answers appear to lie in the way the system deals with its users and the way it monitors the volume of their uses. In current practice, as we understand it, a system will make some provision, in its agreement with each user, that purports to limit the extent of the material to be taken from any data base, and to restrain the user from supplying the material taken to anyone else. Moreover, since the fees charged for use of each data base in the system are based on the length of time that the user is on-line, or on the number of items included in an off-line report, the system must keep records of the extent of uses made of each data base. If the recorded use of a data base seems suspiciously excessive, the system could report the facts to the publisher for further investigation. Publishers might require, in their contracts with system operators, that such cases be reported to them.

Another factor serving to inhibit the theft of a data base by the on-line user of a computerized system, under present-day conditions, is the very high cost of using the system for the length of time it would take to do so. It might be less expensive to lease the whole data base from the publisher.

A.4.4.5 Exclusive and Compulsory Licenses for Use of Data Bases. In some instances publishers of data bases have leased them exclusively for use in one computerized information service system, thereby making them unavailable for use by any other such system. This practice of exclusive licensing may have either of two results that might eventually prove to be undersirable.

First, if each of several competing systems has its own exclusive group of data bases in some particular subject area, no one system will be able to provide researchers with comprehensive coverage of that area. The consequent necessity for searching through more than one system -- perhaps through several of them -- will probably diminish the convenience and effectiveness and increase the cost of bibliographic searches, as compared with a single search through one comprehensive system.

Second, exclusive licensing of data bases may tend to foster the monopolization of data base search services by one or two giant systems. Whether the prevention of such a monopoly or the regulatory control of a permitted monopoly as a public service organization, would be preferable is an open question.

From the standpoint of providing maximum service for researchers, and at the same time preventing the development of a monopoly in the business of providing bibliographic search services, the ideal situation might be the development of a number of competing systems each of which can offer comprehensive coverage of any subject area. One way of encouraging such a development would be to provide for a compulsory licensing scheme under which a data base made available for use in any one system would thereupon become available for use in all other systems.

A compulsory license of this character would be similar to the one (the first of its kind) that was established by the Copyright Act of 1909 for the making of mechanical sound recordings of copyrighted music. (See sections A.2.3.1 and A.2.3.2 of this report.) In that precedential case the compulsory license scheme was prompted by the threat of a monopoly being established in the manufacture of such recordings of music. This and other compulsory licensing schemes will be discussed later in section A.4.6.3 of this report.

Whether a compulsory licensing scheme for the use of data bases in computerized information systems is needed, and whether it would be desirable, are debatable issues. There is no doubt much to be said in favor of allowing market forces to operate normally in the leasing of data bases and the development of information systems. We merely mention the proposition of compulsory licensing here as a possibility that may be worth consideration in the future.

A.4.5 FULL-TEXT STORAGE AND RETRIEVAL OF DOCUMENTS

A.4.5.1 Preliminary Observations. A few years ago there was a good deal of speculative discussion of the possibility that, at some time in the future, computer technology will have developed to such a far-reaching extent that computer systems might become the principal storehouse of the world's published knowledge. In this dream of a brave new era, computer systems were pictured as replacing printed copies of books and journals as the primary means of recording and disseminating works of authorship. Computer systems, in conjunction with modern communications technology, would then become the main source of documents for reference or reading.

By now, this dream has receded into the far distant future. It is generally acknowledged that the full-text storage of a large mass of documents in a computer system would be far too costly to be feasible now or in the predictable future. And as long as copies of documents are made readily available in some other manner -- as in printed or photocopied pages or in microform reproductions --, there would be no apparent reason to incur the very high cost of using computers for full-text storage and retrieval of a vast collection of documents.

To a limited extent, however, some complete documents are now being put into computer systems for various purposes, and this practice may well expand rapidly in the coming years. Moreover, it may be important to consider now the problems that can be anticipated with respect to the future possibility of computer storage and retrieval of the full-text of copyrighted documents on a large scale.

The anticipated problems relating to the use of copyrighted documents in computer systems have been discussed at some length in the Congressional hearings on the copyright revision bills, especially in the Senate hearings in 1967, and in more recent articles. The discussion of those problems has been concerned primarily with the following questions:

(1) Under what conditions should the input of copyrighted documents into a computer system be deemed to infringe the copyright?

(2) Under what conditions should the output of such documents or portions of them from the computer system be deemed to infringe the copyright.

(3) Where permission from the copyright owner is required for the use of a document in a computer system, should such permission be obtained before input, or should it suffice to obtain permission before output?

A.4.5.2 Input and Output of Documents as Infringement. It will be perceived that, in the main, the questions concerning the input and output of copyrighted documents are substantially the same as those pertaining to the input and output of copyrighted data bases. In fact, data bases are a category of complete documents in themselves. Accordingly, the discussion of these questions above in relation to data bases would be applicable to the storage and retrieval of the full text of copyrighted documents in computer systems. As to input, see sections A.4.4.2.1 and A.4.4.3.1 through A.4.4.3.4. As to output, see sections A.4.4.4.1 and A.4.4.5.

One difference, however, may be noted. Whereas the output from a data base will usually consist of a few only of the mass of items in the copyrighted compilation of data, the output in the case of a document will ordinarily be of the entire work. In the latter case there would be no question of fair use. However, the user of a computer system could not be charged with infringement for his extraction from it of a complete copy of a copyrighted document as long as the system is authorized to provide its users with such documents. But if he then used the copy so extracted to make further copies of the document, he would thereby be infringing the copyright. And if a person not entitled to use the system did so surreptitiously to produce copies of copyrighted documents, he would be committing an infringement of the copyright as well as an offense against the system itself. It seems likely, however, that wrongful acts of this nature would often escape detection. (Cf. section A.4.4.4.2.)

One more point is in order here. We suggest that a publisher would be well advised, when he licenses the input and output of copyrighted documents in a computer system, to require the system to have its computer programmed to reproduce the copyright notice on each reproduction of the work as output. (Cf. section A.4.4.1.2.)

A.4.5.3 Input or Output as Occasion for Obtaining License. We have adverted earlier to the discussion, in the 1967 Senate hearings on the copyright revision bill and elsewhere, of the question whether the input of a copyrighted document into a computer system should require a license from the publisher, or whether input should be free though a license will be required for output. The arguments advanced for free input, enunciated mainly by members of the academic community, may be summarized as follows:

(1) Works may be put into computers for the purpose of a noninfringing manipulation of the work within the computer that will not result in any output of the work itself. Known examples include the analysis of the text of a work to show the characteristics of an author's style or the frequency of word uses, or the preparation of a concordance or index. Input for such noninfringing purposes should be exempt from copyright.

(2) Input should be regarded as being merely the means of making a work available to users, i.e., as being comparable to the noninfringing act of placing a copy of a work on the shelves of a library.

(3) Even when a work is input for the purpose of making it available for output, its output may never be requested.

(4) Input of itself does not affect the publisher's market for copies of the work.

(5) The copyright license fees payable to the publisher should be based on the volume of output. No separate fee should be charged in addition for input.

In refutation of those arguments, and in support of the proposition that a license should be obtained before input, the following contentions have been made on behalf of authors and publishers:

(1) Input for any purpose entails the machine-readable reproduction of the work. Such reproduction and input of the work constitute a valuable use of the work, whatever the purpose may be. There is no valid basis for exempting such reproductions from the exclusive right of the copyright owner to make copies of his work.

(2) Libraries are generally expected to buy copies of the published works they place on their shelves. Likewise, computer systems should be expected to obtain the

machine-readable copies they need for input, or to obtain licenses to make them, from the publishers. If free input implies that computer systems are free to make their own machine-readable copies, the publisher's potential market for such copies would be destroyed.

(3) When output is contemplated, input of itself, by making copies of the work available as output, displaces potential sales of printed copies of the work.

(4) Licensing before input is necessary to enable the publisher to know that the work is being used in the system and to see that appropriate arrangements are made to compensate him for such use.

(5) Since a license will admittedly be required for output, practical considerations dictate that the terms of the license, including the basis for assessing fees, should be settled between the parties before input is effected.

As may be perceived from our earlier discussion relating to the input of data bases, in section A.4.4.3.4, we are inclined to believe that the weight of the argument comes down on the side of requiring licenses to be obtained before input.

A.4.6 BLANKET LICENSING AND COMPULSORY LICENSING FOR REPRODUCTION OF DOCUMENTS

A.4.6.1 Need for Blanket Licensing Mechanism. The ideal of providing researchers, through computerized data base systems, with bibliographic data relating comprehensively to all the published documents pertaining to any particular fields of science and technology has been mentioned in section A.4.2.2 of this report. Also mentioned there and in section A.4.2.3 is the further need of the researcher to be able to obtain expeditiously copies of the documents he identifies as being pertinent to his inquiry. And we noted that the documents needed for scientific and technical research are now mainly articles published in journals.

If and when computer storage of documents should become practicable on a sufficiently large scale to comprise complete libraries of virtually all the documents in any subject area, there will be a compelling need for some mechanism that will facilitate obtaining the licenses required for input and output of the mass of copyrighted documents in such a comprehensive library.

Meanwhile, the problem of supplying researchers with copies of documents on a comprehensive scale through other, existing sources, including libraries and other information centers, is already with us. (We have suggested earlier, in passing, that the time may not be too far off when such document supply centers will be operated in conjunction with, or as adjuncts to, computerized data base systems.) A few commercial organizations now supplying copies of copyrighted journal articles have succeeded in arranging for licenses from a large number of publishers. Libraries have been supplying photocopies of articles from journals in their collection but, with respect to copyrighted material, they have usually purported to do so within the limited scope of fair use.

It is generally recognized that, for a document supply center wishing to provide copies of articles from a large number of journals, the process of seeking out, and obtaining licenses individually from, each of the many publishers involved could be so time-consuming and costly as to be impracticable. (At any rate, this is the widely and firmly held consensus notwithstanding the success of at least two commercial suppliers of copies of journal articles -- University Microfilms and the Institute for Scientific Information -- in obtaining such licenses for a large number of journals.) It is also generally agreed that the publishers of copyrighted journals are entitled to be paid for reproduction of their articles (except for the limited reproduction permitted as fair use).

With two objectives in mind -- namely, to facilitate the mass licensing of copyrighted material for reproduction by document supply centers, and at the same time to provide for compensation to the publishers -- it has been urged that "clearinghouses" be organized through which blanket licenses could be obtained for an entire catalog of the copyrighted journals of as many publishers as can be brought within the organization, and lump-sum payments could be made for distribution among the publishers.

There are two existing types of blanket licensing mechanisms in other areas that might serve as prototypes for the blanket licensing of reproduction of copyrighted journal articles. One is a voluntary type of clearinghouse established by the copyright owners of musical compositions for licensing public performances. The other is a compulsory license plan established by the new copyright statute to permit the use of copyrighted works en masse, upon payment of lump-sum royalties, by CATV systems, jukebox operators, and educational broadcasters. We shall now look at these two types of blanket licensing mechanisms in turn.

A.4.6.2 Voluntary Clearinghouses. Possibilities for establishing a voluntary clearinghouse for the blanket licensing of copyrighted journal articles for reproduction have been under discussion, off and on, for a number of years. The development of an acceptable plan has been found to be beset with many difficulties. Two or three fairly detailed plans have been proposed in outline and put aside as unsatisfactory. The discussions so far have hardly gone beyond attempts to explore some of the possible bases on which such a clearinghouse might be organized and operated, and to expose the difficulties that might be encountered in establishing a workable mechanism.

A.4.6.2.1 ASCAP and BMI as Models. In the discussions referred to above, the clearinghouses operated by the American Society of Composers, Authors and Publishers (ASCAP) and Broadcast Music, Inc. (BMI), have frequently been cited as possible models that might be adaptable for the blanket licensing of reproduction rights in journal articles.

ASCAP is a voluntary membership association of writers and publishers of copyrighted music. It was established to license and enforce the rights of its members collectively in public performances of their music. A few statistics taken from recent reports will indicate the size and effect of its operation. Its membership consists of about 18,500 writers and 5,300 publishers of music. Its catalog of musical compositions is constantly growing, and the number of compositions covered by its licenses (a figure that is not announced) must now be well in excess of a million. Its gross revenues from domestic licenses is now over 80 million dollars per year, and from foreign licenses is over 13 million dollars per year. Its cost of operations in recent years has run to about 19 or 20 per cent of its gross revenues. The remainder of about 80 per cent is distributed among its writer and publisher members under a rather complex formula in which the principal basis for allocation is the estimated number of performances of each member's works.

ASCAP issues licenses to a number of different classes of users. The largest users, from which it derives a major portion of its revenues, are the radio and television networks. Other classes of users include local broadcasters, music and dance halls, orchestras and bands, hotels and restaurants, wired music services, business establishments, etc. ASCAP announces periodically a schedule into which its users are divided. As required by consent decrees of the United States District Court for the Southern District of New York, it must license all qualified applicants, all licensees in the same class are charged the same fees, and any licensee or applicant may request the Court to review the fees charged.

The royalty fee payable by a user is a flat sum per year for a blanket license permitting his performance of any and all of the music in ASCAP's catalog. Broadcasting networks supply ASCAP with logs identifying the compositions performed by them, and ASCAP conducts a sampling of performances by some of its other licensees, and these are the bases for ASCAP's determination of the allocation of its net revenues among its members.

Two other organizations also license performances of music on a blanket basis in much the same manner as ASCAP. One of them is Broadcast Music, Inc. (BMI), which rivals ASCAP in the size of its operation. BMI is an incorporated organization which represents about 30,000 writers and 10,000 publishers of music in licensing a collective catalog of their copyrighted music. Its catalog is reported to contain one million compositions, and its gross revenues are about 50 million dollars per year. Its payments to its members are based on contracts which are designed to distribute among them the net revenues of BMI after deductions from the gross for its expenses and reserves. Its fees charged users, like those of ASCAP, are a lump sum per year and are uniform for all the users in any class.

The third organization licensing performances of a collective catalog of music is SESAC, Inc., a commercial company that contracts with another smaller group of writers and publishers to license their copyrighted music. Its catalog is a relatively small one of special kinds of music. Statistics concerning the size of its operation have not been determined. Its fees charged licensees are also fixed at a lump sum per year.

The effectiveness of ASCAP and BMI may be attributable in large part to the following factors:

(1) The copyright owners of music have realized that they cannot enforce their performance rights individually. They have therefore felt compelled to join in collective organizations that can monitor and license performances for all of them as a group. As a result, the combined membership of ASCAP and BMI, together with the relatively small number of those affiliated with SESAC, comprise the copyright owners of virtually all music copyrighted in the United States.

(2) Users who obtain a license from each of the three organizations are virtually assured of the right to perform

(except for dramatic performances which these organizations do not license) any and all of the compositions they might choose to perform.

(3) Licensees are not burdened by the necessity for maintaining records of the compositions they perform. Fortunately for ASCAP and BMI, the largest source of their revenue from licenses, the broadcasting networks, do maintain logs of the compositions they perform and supply those logs to the organizations. Those logs, plus a limited amount of sampling of the performances by other licensees, are sufficient for allocation of the fees collected by ASCAP and BMI among the individual copyright owners.

(4) Licensees are required to pay only a lump-sum royalty fee annually in a predetermined amount.

How far can these factors -- universal coverage; ease for users in obtaining licenses and in accounting and paying for their uses; and the ability of the organization without too much cost, to distribute its revenues among the copyright owners on an equitable basis -- be duplicated in an organization for the blanket licensing of copyrighted journal articles? The answer to that question may determine the feasibility of establishing such an organization.

A.4.6.2.2 Problem Areas. Attempts to plan a clearinghouse for the blanket licensing of reproductions of journal articles run into a number of problems. We are not undertaking to offer solutions to those problems, or to propose any plan for such a clearinghouse. We shall merely mention some of the major problems and some suggested approaches to meeting them.

Perhaps the most difficult set of problems relate to reconciling several imperatives: The basis on which licensees pay fees must be kept simple to avoid expensive record-keeping; some information as to the identity of the journals used and the number of uses may be needed to determine how the fees collected are to be distributed among the publishers; the operating expenses of the clearinghouse must not be so high as to consume too much of the fees collected.

Assuming that the sum to be paid by a licensee as fees is to be related to the volume of reproductions made by him, how is that sum to be assessed? To require licensees to keep records of each reproduction of

individual articles would probably be excessively burdensome. For the purpose of assessing the fees, perhaps it would suffice to have the licensee report only the total number of units (e.g., articles or pages) reproduced by him from all of the journals in the aggregate.

This would leave the problem of how the clearinghouse is to determine what portion of its net receipts is to be distributed to each of the publishers. Perhaps a limited amount of sampling would be enough for this purpose. For example, each licensee might be asked to keep records of the articles he reproduces during a short period of time such as one or two weeks each year. Or those licensees only who are known to be the large volume users might be asked to keep such records for somewhat longer periods of time. Or perhaps such records kept by the licensees could be dispensed with entirely if it were assumed that the proportionate volume of reproductions by all users from any one journal is roughly equivalent to the proportionate volume of its subscriptions or sales. And other alternatives could no doubt be thought of.

If record-keeping by the clearinghouse as well as by the licensee can be kept to a minimum, there would seem to be a fair prospect that, with fees fixed at appropriate but reasonable amounts, the clearinghouse would have enough net revenues to give publishers a significant return.

Several other problems that may need to be resolved can be mentioned:

-- The publishers of scientific and technical journals (which we assume to be the material for which a clearinghouse is most urgently needed) will have to be persuaded to join the clearinghouse. Inclusion of nearly all of them may be necessary to provide adequately comprehensive coverage. If it can be shown that the proposed clearinghouse is likely to become profitable within a few years, it should not be difficult to enlist the publishers.

-- Some library groups have objected that blanket licensing may result in their paying for what are now fair use reproductions. Perhaps the license fees can be so adjusted ad to overcome this objection.

-- A clearinghouse licensing reproductions from most of the existing copyrighted journals may be charged with operating as a monopoly under the antitrust laws. This problem might be resolved by appropriate legislation granting an exemption, or by negotiations with the Department of Justice. Precedents for a statutory exemption from the

antitrust laws are now found in the Copyright Act of 1976 (sections 111(d)(5)(A), 116(c)(2), 118(b) and 118(3)(1)), with respect to copyright owners or users acting as a group, or through a common agent, in negotiating and agreeing upon royalty rates and the distribution of lump-sum royalty receipts among the members of the group.

A.4.6.3 Compulsory Licensing. Compulsory licensing was originally provided for in the Copyright Act of 1909 as a device for preventing the establishment of a monopoly. One manufacturer of phonorecords of music, anticipating that the law would be revised to give the copyright owners of music a new exclusive right to make recordings of their music, had obtained agreements from the major music publishers to give him exclusive rights to record all the musical works in their catalogs. To prevent this potential monopoly, Congress provided in Section 1(e) of the Act of 1909 that once the copyright owner permitted one company to make a recording of his music, anyone else was permitted to make a similar recording upon payment of two cents per composition for each record manufactured.

One result of this compulsory license provision has been the establishment of a central agency -- the Harry Fox Office -- through which most of the music publishers issue licenses for the recording of individual compositions. Record companies generally obtain such licenses from the Harry Fox Office instead of exercising the compulsory license under the terms of the statute, because the licenses issued by that Office are more favorable than the statute in several respects.

The Harry Fox Office is an example of a centralized agency for licensing the works of a number of publishers. It is no doubt more convenient for licensees than would be the case if (without the compulsory license) they had to negotiate for licenses with each publisher separately. But it should be noted that the Harry Fox operation is not an example of blanket licensing. It issues licenses for individual compositions as requested. It has a standard form of license agreement and a fixed schedule of royalty fees applicable to all the compositions alike, but licensees may, and often do, negotiate with the Office for reduced fees in special cases.

The new Copyright Act of 1976 provides for compulsory licenses of a different character in three situations: For the performance of music in jukeboxes, for CATV retransmissions of broadcast programs, and for the use of certain works in noncommercial broadcasting. These are examples of blanket licensing. The purpose of the compulsory

license in these three instances is not to prevent a monopoly, but is to avoid the difficulties that the user groups would encounter if they had to obtain licenses from and pay fees to the individual copyright owners.

A.4.6.3.1 The Compulsory License for Jukeboxes. The Copyright Act of 1909 contained a specific exemption for the performance of music on coin-operated machines (popularly called "jukeboxes"). This has been cited for many years since as an outstanding example of short-sighted legislation. During the hearings in the 1960s on the copyright revision bills, it became evident that the Congressional committees had concluded that jukebox operators should pay for their use of copyrighted music. Obtaining licenses would present no great problem for jukebox operators since they could obtain blanket licenses from the three performing rights licensing organizations (ASCAP, BMI, and SESAC). But, as the jukebox operators demonstrated, to require them to keep records of their performances of each composition would impose a tremendous and costly burden on them.

To avoid this difficulty, Congress provided, in section 116 of the Act of 1976, for a compulsory license under which jukebox operators may use any copyrighted music in their machines, for which they are to pay annually a single lump-sum royalty. To obtain the compulsory license, the jukebox operator is required to file in the Copyright Office information identifying himself and his machines, and to deposit the royalty payment with the Register of Copyrights. The operator is then given a certificate for each machine which he must affix to the machine.

The royalty is fixed in the statute at $8 a year per machine. The copyright Royalty Tribunal (established under sections 801-810 of the Act) is authorized to adjust the royalty rate periodically upon petition by any of the interested parties.

Distribution of the accumulated royalty fees among the copyright owners (after the deduction of certain expenses) is to be made by the Copyright Royalty Tribunal on the basis of claims filed with it by the copyright owners. There is a provision in the statute allowing persons who may have claims to have access to the licensed machines and the opportunity to obtain information, "by sampling procedures or otherwise," pertinent to their claims.

It may be observed that the appropriate distribution should not be difficult to determine in this case because the great bulk of the royalties will be payable to the three performing rights licensing organizations,

and specific provision is made for an agreement among them as to their respective pro rata shares. The three organizations have indicated that they are confident of being able to reach such an agreement.

A.4.6.3.2 The Compulsory License for CATV Systems. We have already outlined, in section A.2.6.1 of this report, the provisions of section 111 of the Copyright Act of 1976 under which cable television systems are given a compulsory license for their retransmissions of broadcast programs containing copyrighted works. To recapitulate the essential features of the compulsory licensing arrangement:

-- The compulsory license covers the broadcasts of all stations whose signals the cable system is authorized by the FCC to carry.

-- To obtain the compulsory license, the cable system is required to file in the Copyright Office a statement identifying its owner and the broadcasting stations whose signals are regularly carried by it. The Register of Copyrights may, by regulation, require the filing of further information if found to be necessary.

-- The cable system is to deposit with the Register of Copyrights semiannually a statement of account showing (1) the number of its channels used for retransmissions and the broadcasting stations whose programs were retransmitted, and (2) the number of its subscribers and the gross amounts paid by them to the system for its retransmission service. The Register of Copyrights may by regulation, require additional data to be furnished.

-- The cable system is to pay to the Register of Copyrights for each semiannual period a single royalty fee computed on a sliding scale of specified percentages of its gross receipts from subscribers for its retransmission service.

-- The aggregated royalty fees (after certain expenses are deducted) are to be distributed by the Copyright Royalty Tribunal on the basis of claims filed by copyright owners whose works were included in the nonnetwork programs of distant stations carried by the cable systems.

-- The Copyright Royalty Tribunal is authorized to review and adjust the royalty rates from time to time, under standards stated in the Act, upon petition by any interested party.

The task of the Copyright Royalty Tribunal in determining how the aggregated fees are to be distributed among the claimants will probably be more difficult here than in the case of jukeboxes. The copyright owners whose works are used in broadcast programs are large in number, and their works are diverse in character. This problem may be eased somewhat by a provision in the statute that claimants may lump their claims together and may agree among themselves as to their division of the aggregate sum paid on their claims.

A.4.6.3.3 The Compulsory License for Noncommercial Broadcasting. The Copyright Act of 1976 makes noncommercial broadcasters liable for their performances and displays of copyrighted works (with certain exceptions not pertinent here) for which they have heretofore claimed to be exempt from liability. The noncommercial broadcasters argued before the Congressional committees considering the revision bills, that with respect to certain kinds of works at least, the process of obtaining licenses for their use of copyrighted works individually would be extremely difficult and costly. Congress was persuaded to include in the 1976 Act, in section 118, a compulsory license for the use by noncommercial broadcasters of published nondramatic musical works and published pictorial, graphic and sculptural works (and for certain educational uses of recordings of their broadcast programs containing such works).

The compulsory license provisions in section 118 of the Act for noncommercial broadcasting are quite different from those relating to jukeboxes and CATV systems. The terms and conditions of the compulsory license under section 118 are not spelled out in the statute, but are left for the Copyright Royalty Tribunal to establish.

Section 118 contemplates that copyright owners and noncommercial broadcasters, or groups of them on either side, may negotiate their own licensing agreements, and these are given effect. For those instances where no such voluntary agreement is made, the Royalty Tribunal is to establish the "rates and terms" for the permitted uses of the specified categories of copyrighted works by the broadcasters, after considering proposals submitted to it by any interested parties and the rates for comparable circumstances under existing voluntary license agreements. The rates and terms for the compulsory license are to be reviewed and prescribed anew by the Tribunal every five years.

No express provision is made for the collection and distribution of royalty payments. It is provided that the Tribunal is to establish "requirements by which copyright owners may receive reasonable notice

of the use of their works under this section, and under which records of such use shall be kept" by the broadcasters. Apparently, the copyright owners or their group agencies are expected to collect their own royalties.

A.4.6.4 Concluding Comments. If a voluntary clearinghouse satisfactory to both copyright owners and users can be organized, that would seem to be preferable over a statutory compulsory licensing scheme. A voluntary clearinghouse would be more nearly in accord with the basic philosophy of copyright which contemplates that the author should have control over the use of his work. Congress seems to have demonstrated its preference for voluntary licensing arrangements in the provisions of section 118 of the Act of 1976, suggesting that the copyright owners and noncommercial broadcasters should try to negotiate voluntary agreements between themselves, and giving such agreements effect over the compulsory licensing scheme to be devised by the Copyright Royalty Tribunal. Perhaps the most important consideration is the greater flexibility of a voluntary arrangement and its easier accommodation, by negotiations between the groups concerned, to experience and changing circumstances.

SUPPLEMENT 1 STI TECHNOLOGY

S.1 INTRODUCTION

The conceptualization of the characteristics of STI Systems is important in order to develop an understanding of their capabilities as they might impact copyright law issues. As we have seen in Section 2, the development of new technologies has oftentimes raised serious legal issues in defining the applicability of these new technologies within the existing bounds of copyright law.

The development of computer technology has led a variety of organizations to incorporate the computer as an essential element of the organization resources. At first, the computer was used mainly as a tool to replace human resources in time consuming repetitive tasks. Within a relatively short time period, advances in electronic technology led to more and more applications for which computers offered benefits to increase the operational scope of organizations. One such application, the scientific and technological information (STI) System will be described in detail, and a brief history of some of its salient characteristics will be presented.

S. 2 THE STI FACILITY

STI facilities may be broadly divided between those organizations which create STI data bases and those who disseminate the information to the general public. Both types of organizations require a basic hardware/software configuration in order to support STI applications. The major elements of such configurations are:

- o A central processor
- o On-line storage devices
- o Data entry devices
- o Data storage devices
- o An operating system
- o A data base management system
- o Miscellaneous application programs

S.2.1 CENTRAL PROCESSORS

The central processor found at a typical STI facility is a large-scale general purpose computer. A minicomputer, although it possesses considerable power, is not compatible as central processor for STI applications, at present. The use of minicomputers is limited by the demands of the users, which require relatively short response times to their inquiries and technology limitations to efficiently manage a large on-line data base. Computers of similar size are being used by creators and disseminators of STI Systems.

S.2.2 DISC STORAGE

The amount of information contained within a single data base is usually quite large. The Chemical Abstracts Condensates contain over 1.6 million items. The storage capacity of a large general purpose computer (core) is too small to store the data base in its main memory. Disc storage is therefore required to extend the storage capacity. Although information stored in core can be accessed within microseconds, while a disc operates in milliseconds, the impact upon a user is minimal.

A single disc may contain 5 million characters of information. A character is usually defined as equivalent to a single letter, number or punctuation identifier. However, since a record (of information) is composed of several letters, words, and other identifying information, a single disc can contain only part of the very largest STI data bases. An STI system therefore will often contain several disc packs, each disc pack consisting of approximately 8 discs. In this manner, the capacity of the STI system has been increased several times over the core storage available within the central processor.

S.2.3 DATA ENTRY DEVICES

Another essential element of an STI system is data entry devices. They may be CRT (cathode ray tube) terminals, punched card readers, or paper or magnetic tape units. A distinction needs to be made between organizations which create STI data bases and those which operate on-line retrieval services. In the former case are organizations such as Chemical Abstracts who compile, edit, and organize STI data bases. Data base creation requires a staff which can punch or type in monthly updates to add to the existing data base. In this instance, a CRT or punched card facility is most appropriate. This method would be too costly for on-line search and retrieval services. They receive the data base or monthly update on magnetic tape. The tape is mounted and, through a software package, the information is used to update their on-line (disc) data base.

S.2.4 MAGNETIC TAPE

Creators of STI data bases also have a requirement for magnetic tape units as well as the on-line search services. Magnetic tape is a sequential storage medium; that is, to locate information, the entire tape may need to be read. Even with a high speed tape drive, this process can average 2-5 minutes. This is not suitable for on-line searching, whereas a disc can locate information with 75 msec. Magnetic tape is more often used for archival storage as its price is less, and the capacity, depending upon the tape, is nearly equal. Older editions of the data base can be conveniently stored on magnetic tape. Two other uses are made of magnetic tape editions of the data base. First, data base copies are usually maintained in case the on-line data base is accidently destroyed or damaged. Second, a magnetic tape is easier to ship to STI data base leasors than a disc. Discs are more fragile and require careful packing to insure against damage.

S.2.5 HIGH SPEED PRINTERS

A high speed printer is usually found at most computer facilities, including those which contain STI data bases. They serve two main purposes: First, to provide a hard copy of information from STI systems when the volume is large or the user has no hard copy capabilities of his own. Additionally, the maintenance of the data base may involve a detailed examination of portions of the data base. In these instances, a hard copy is more useful than access through a CRT.

Other computer hardware may also be found at an STI facility. Data communications equipment such as modems, front-end processors, and multiplexers which allow remote users to access the STI data bases, will be found where on-line search services are offered.

S.2.6 SOFTWARE

In addition to computer hardware, software is also required to control and search for information contained within STI data bases. Software can be defined as the programs that direct computers to perform specific functions. A software package is a computer program or set of programs designed to perform one or more well defined functions. Of concern to this discussion are mainly the "systems package." Systems packages are programs or sets of programs that make it possible to use a computer more conveniently or operate it more effectively. Included in this category are both operating systems and data base management systems.

The operating system, sometimes called the executive, manages the computer resources and permits the user to interact with the system. Initial access to a STI on-line system is under the control of the operating system. Almost all user-oriented systems have an operating system; however, in the case of STI systems, limits are placed upon what the user may do. For example, unlike timesharing computer systems, the user cannot create his own programs or modify the stored data bases. In a STI environment, the user can gain access only to STI data bases and issue commands relevant to the use of the computer for access or search of the data base.

Once an appropriate STI data base is selected for searching, the user is placed under control of a data base management system (DBMS). It is the DBMS that actually examines the data base to determine if the user's specified parameters can be matched by the stored information within a STI system.

The method of operation while under the control of a DBMS system in a STI environment is to define identifiers or descriptors upon which a search is based. Examples of descriptors are:

- o Author's name
- o Subject
- o Title
- o Key word

Searching can be quite complex according to the sophistication of the user and the DBMS system.

Figure I is a functional schematic of a STI facility and shows the layout and interconnection of the hardware.

S.3 STI ON-LINE DATA BASES

In order to limit the discussion of STI systems, we will confine ourselves to describing the services offered by on-line search services. Figure II contains a description of the STI data bases offered. The information contained within each data base is limited to descriptive information of articles published in scientific and technical journals. Some data bases contain brief abstracts of the articles cited. At

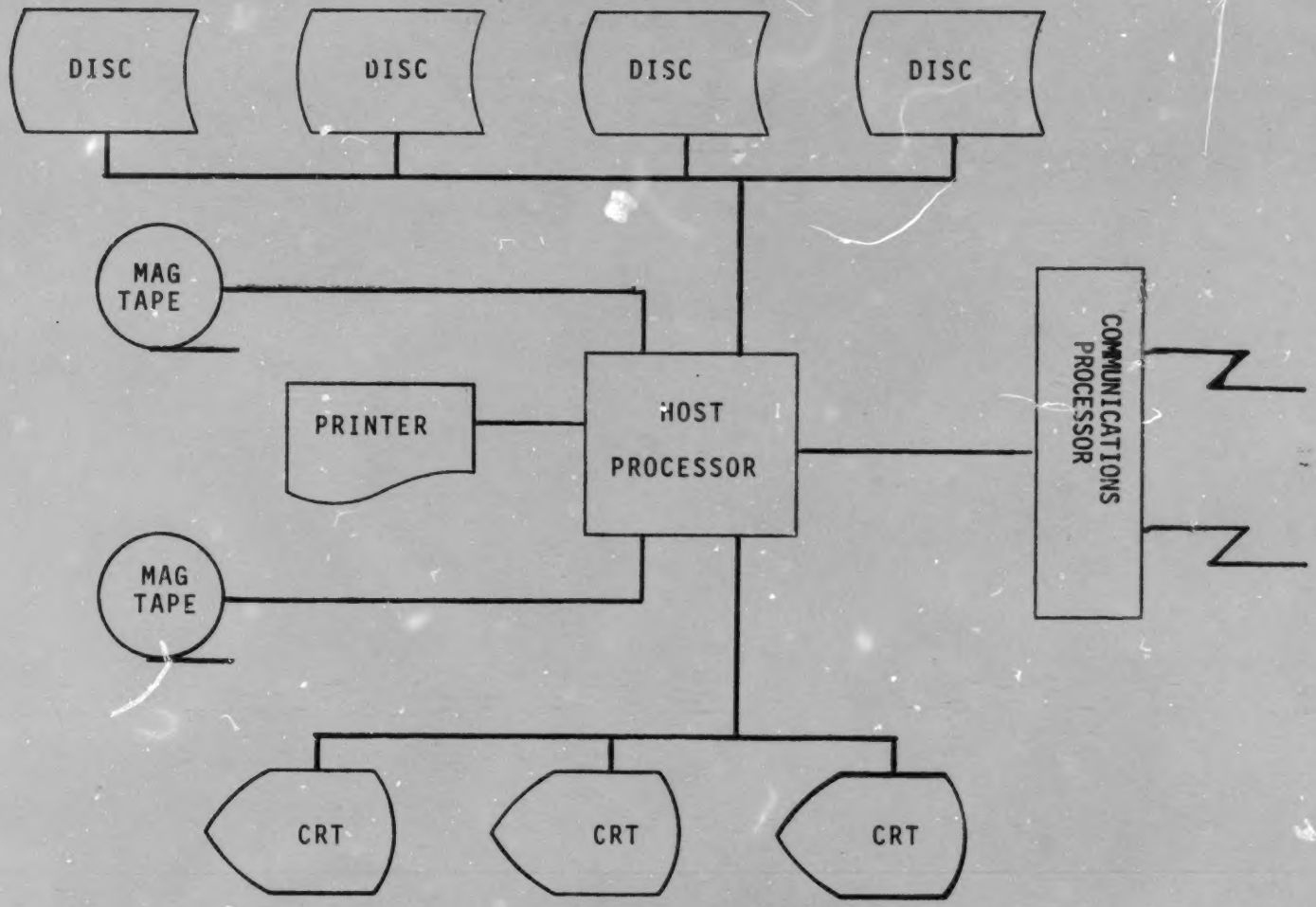

FIGURE I FUNCTIONAL CONFIGURATION OF A COMPUTERIZED STI SYSTEM

A-105

DATA BASE NAME	DATA BASE SUBJECT AND SOURCE	DATA BASE COVERAGE		UPDATING	
		ENTRY DATE	APPROX. NO. ITEMS (8/76)	FREQUENCY	NO. OF ITEMS
*GRANTS	Is complete single source reference to more than 1500 grant programs offered by federal, state and local governments, commercial organizations, associations and private foundations in over 88 disciplines, including adult education, agriculture, social sciences, fine arts, architecture, natural sciences, banking and business, health sciences, and law. Prepared by Oryx Press. (Operational January, 1977)	current	1,500	monthly	50
INFORM	Covers business management periodical literature from over 300 journals, in the areas of finance, management, economics, statistics, business law, and marketing. Journals such as Duns Review, Harvard Business Review, and Nations Business are abstracted. Prepared by ABI, a division of Data Courier, Inc.	Aug. 1971	44,500	monthly	1,200
*LIBCON/E	Covers English-language materials in all subject areas of the monographic literature and audiovisual materials, and includes MARC records from the Library of Congress as well as many more LC-cataloged items.	Jan. 1965	691,700	weekly	7,000
*LIBCON/F	Same as LIBCON/E, but covers non-English-language materials.	Jan. 1965	707,700	weekly	7,000
NTIS	Is a broad and cross-disciplinary file containing citations and abstracts of government-sponsored R&D reports and other government analyses prepared by Federal agencies or their contractors and grantees. Corresponds to the Weekly Government Abstracts and the semimonthly Government Reports Announcements. Prepared by National Technical Information Service (NTIS) of the U.S. Department of Commerce.	Jan. 1970	356,400	biweekly	2,300

present, no full-textual materials are stored by on-line search services. The reason is both technological and economic. The on-line storage capacity required for complete textual storage of all scientific and technical journals currently indexed by STI data bases would be very large. Information is largely alphabetic characters, which at present, are not efficiently stored by current computer technology. Economically, the cost of operations would increase substantially. In addition, the utilization of the computer storage resources would decrease, due to the existence of stored texts that might be accessed on an infrequent basis. The computer-based information system which is based on high speed data manipulation and an ability to perform repetitive iterations on large volumes of information does not function well in an environment which demands large storage capacities.

S.4 COMPUTERIZED STI SYSTEMS

After review of the collected information of new technologies and copyright and computerized STI systems, we have determined that three characteristics of computerized STI systems merit further discussion. They are the development of:

- o On-line storage (disc)
- o Efficient data base management systems
- o Access to computers through data communications networks

Without these three technological enhancements to computers, the possibility of computerized STI system would have been too costly to operate and too difficult to manage. Together, these mechanisms provided the users of STI systems with a methodology that made more information available, at a faster speed, and with a decrease of human resources.

In comparing these innovations, specifically in the area of STI systems, it is helpful to consider the library as the opposite extreme of a computerized STI system. Given a sufficiently large library with adequate resources, the results of a scientific search would be similar to that accomplished by a computerized STI system.

A library, where a literature search is conducted of relevant journals, is an inherent part of the scientific and technological method. To satisfy the researcher's need to obtain information, he could either browse through the library stacks or rely upon extracting information sources from compilations of abstracts of scientific journal (i.e., chemical abstracts). The process required considerable time as the

compilations were limited in indexing methods to principally the subject matter and the author(s). In addition, libraries, except the very largest, did not always contain the range of information required to meet the needs of a variety of researchers. To complete an in-depth literature search might require visits to one or more libraries. Thus, from the researcher's point of view, the library, as a non-computerized STI system, was difficult to use; time consuming; not readily available; often incomplete, and subject to errors and omissions. However, the library, as an STI system, was not without some merits. It provided, through browsing, a means to circumvent the limitations of cataloguing reference material or compilations of abstracts. Furthermore, full text storage of books, periodicals, and journals at a library allowed the researcher to investigate in-depth his topic of interest.

The development of an on-line disc storage medium provided the capability to extend the total storage capacity of a computer system. Prior to the development of disc technology, the computer had to contain information within its main memory or retrieve information from a magnetic tape. The main memory was limited in size, although information within it could be accessed within microseconds. As noted earlier, magnetic tape could hold sufficient material to develop a computerized STI system but, as a sequential access medium, each search would require the time consuming process of reading the entire tape.

The development of disc technology meant that the computer system could not only accommodate the large volumes of information required to establish computerized STI systems, but each information record could be found within a short time frame. A disc is a random access storage device as opposed to a magnetic tape which is sequentially accessed. Thus, key characteristics of computers, speed and high volume data manipulation, were matched, in part, to the pragmatic requirements of a computerized STI system.

While disc storage brought a high volume on-line capability to computer systems, the search for information contained within data bases needed a specific applications program to perform the search. Programs already existed for data base manipulation. Until the state-of-the-art advanced, data base management systems were designed for specific operations. Referring to the original STI system, the library, this was equivalent to each library having its own card catalog. Books could not be transferred to another library with recataloguing, and each researcher would need to be knowledgeable of several library systems. Within each library "management system" the ease of the system would also vary depending upon the creativity of the system designers. The resulting nonconsistencies led to the development of general purpose data base management systems.

This technology is the second key element of computerized STI systems because it provided a means of organizing information and searching information so that several users could use the system simultaneously. Its organizational structure was flexible so that data bases could be created from a variety of sources. This was important since formats of STI data bases vary according to the type of data base. The content of a scientific data base would vary from that of an economic data base, etc.

Data base management systems search through data bases using a variety of methods. Most are based on an indexed system in which certain key words or identifiers are examined, rather than each record. In this manner, time is conserved and the computer resources are utilized more efficiently.

The user makes use of key words to describe a subject, author or interest area. The data base management system can then determine if a match (hit) occurs with the contents of the data base. The data base management system is quite powerful since it permits the search words to be combined with Boolean Algebra Logic. This capability adds power to the researcher's ability to clearly identify the search topic.

A skilled computerized STI user can perform complex searches using the Boolean operators. The result is that the computer STI system user has reduced his search time considerably over using a library and increased his ability to find information.

The third key element which enhanced the development of computerized STI systems is development of data communications systems which enable many widely geographically dispersed users to access an STI system concurrently. Without a data communication network, the users would be limited to those at or nearby the STI facility. Economically, this perspective would not justify the large hardware/software costs and data base lease rates required to establish an STI facility. Data communications has allowed the linking together of many remote users into a market large enough to support the operating costs associated with large general purpose computer systems.

The area of data communications includes both the network of dedicated or leased lines and the specialized communications hardware/software. At present on-line communications speed are relatively slow (in the order of 30 characters per second). Higher speeds, although technically available, require costly line conditioning equipment. In addition,

with the current STI systems, the results of a search are usually no more than a few pages of information. Large volumes can be directed to the high speed printer at the STI facility; where the cost is less than on-line printing. If full text retrieval were available under present conditions, the costs of high speed communications and printing at the user's location would require a careful evaluation as to whether the text was time critical. This situation, of course, could change if the economics of STI system user were reduced. At present, it appears that 30 characters per second communications speeds are sufficient for most STI system users.

APPENDIX B

THE ROLE OF TRANSACTION COSTS IN THE DESIGN OF ROYALTY PRICING SCHEMES FOR STI

by

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*The views presented in this paper are solely those of the authors and do not necessarily represent those of New York University.

B.1 INTRODUCTION

In this paper, we shall discuss various schemes for collection of royalty payments for reproduction of scientific and technical information (STI). We shall concentrate on the costs that accompany the enforcement of royalty price schedules. These costs are referred to in the economic literature as transaction costs. These costs have to be included in the design of actual pricing schedules. Indeed, a major argument for excluding certain users from payment is that the transaction costs associated with the collection of payment from these uses exceed the benefits of doing so. We would expect that such arrangements can be worked out between the users and sellers without a necessary intervention of the legislature or the courts.

B.2 PRICING SCHEMES

B.2.1 BLANKET LICENSE SYSTEM

The blanket license system involves a set payment to the owner of a copyright. Once payment is made, an unlimited amount of photocopying can be done.

There are two species of blanket licensing:

(i) direct licensing;

(ii) clearinghouse licensing.

Under (i) the owner of the copyright negotiates directly with the user of a journal/library for a fee. Under (ii) the copyright owner negotiates indirectly through the clearinghouse which pools various copyrights. System (ii) is analogous to the one employed in the music area.

Comparative economics would seem to favor the second variant. The major saving is in transactions costs: both in the case of a publisher negotiating agreements with a multitude of users and in the case of the user (library) negotiating with a multitude of copyright holders. Another major saving for the user results from a reduction in the number of payments that will have to be made. A similar reduction exists on the publisher's side. There are, however, important additional costs that appear if (ii) is used, rather than system (i). The major new cost is associated with the necessity of monitoring the photocopying in individual libraries in order to determine an equitable distribution of the proceeds. Those costs may be significant. According to their own estimates, ASCAP's transaction costs amount to approximately 20 percent of their gross revenue. Such costs would not be expanded under the direct licensing scheme. This is not to say that the direct licensing scheme does not require some monitoring of use, since under this scheme the extent of use will be important in setting the fee.

Overall, however, we suggest that the monitoring costs ought to be significantly lower under (ii) than (i).

What is the economic impact of a blanket fee? In the limit it may not affect the amount of photocopying. This perhaps paradoxical result will be obtained if the library finances the cost of the photocopying permission fee by means of a lump sum (i.e., poll) tax which is levied uniformly on both users and non-users of the photocopying privilege. The poll tax places, however, an undesirable burden on non-users who are, in effect, called upon to subsidize the users.[1] On equity grounds the poll tax is clearly undesirable. Whether it should be implemented depends on how much the society would suffer from a reduction in socially desirable photocopying, which indubitably would occur if user fees were employed. Since unquestionably, a good deal of photocopying does not have any benefits over and above those that accrue to the researcher himself, arguments from both efficiency and equity standpoints would support our preference towards user fees. It should be noted that if a library utilizes the user fee to collect the revenue, it commits resources to generating the same information that is necessary under the per-use license. If it is believed that the collection costs associated with the user fee are excessive, then at the risk of some unfairness a lump-sum tax ought to be imposed. The lump-sum tax is in essence in use now; all faculty members, students, and others contribute at least part of the library budget either in the form of lower salaries or higher tuition fees. Such payments are clearly independent of the use a <u>particular</u> individual makes of the library resources.

B.2.2 PER-USE LICENSE

The efficiency of per-use licensing depends on the expense associated with monitoring the use. Herein lies the main disadvantage of the per-use license over the blanket license. The costs of monitoring are technologically determined. At present these costs are probably high in the area of journal use, but relatively low in the area of bibliographic and data base use. Furthermore, the costs will depend on how coarsely use is defined. For example, different user fees may be imposed on recent journal copies as opposed to older copies. Medical journals may have different user fees than physical science journals, etc. The finer the partitioning of users, uses, and used objects, the better will the pricing system function as a signal towards efficient allocation of resources. Those gains in allocative efficiency must be weighted against the attendant information costs.

B.2.3 TWO-PART TARIFFS

The third system is a combination of the two preceeding ones. The two-part tariff pricing scheme involves a fixed entry fee, independent of use, and the per-use price.[2] Such a system is currently employed

by the telephone company, for example, which charges a connection fee as well as the per-call charge. Such pricing systems have been recommended for industries in which production costs involve a substantial fixed cost element and in which, as a consequence, socially desirable pricing at marginal cost is not feasible in that it does not cover the total cost of output. A form of the two-part tariff would be a system whereby a library would purchase the license to photocopy by purchasing the hard copy of a journal and also pay a fee for each photocopy of an article from a journal in its collection. This would suggest that a pure per-use license is difficult to conceive of because the hard copy price of a journal is in fact an entry fee. (And we note that often libraries pay higher subscription prices than do individuals.) This may be so, but we prefer for reasons of taxonomy to think of the entry-fee component as being an explicit payment for the right to photocopy.

It is clear that the current system does not fit neatly into either of these three categories of exclusion/collection mechanisms. There is in the library price an implicit component of a license to photocopy. But the extent of photocopying which such a license allows is not clear since the meaning of "fair use" is not apparent to either the publishers or to the librarians. Publishers expect some recompense for photocopying of their journals when such photocopying violates the existing statute. This brings on the element of the per-use license discussed above with an additional complication that some forms of use are exempt from that license, the "educational exemption" for example.

The first step in thinking about the appropriate form of a new copyright law should involve a clear understanding of the kinds of pricing mechanism that ought to be employed. This outline provides a basic classification scheme. In the next section, we shall begin to assess more precisely the various transactions costs associated with the three fundamental pricing mechanisms. [Note that for ease of exposition we have not followed here a suggestion often found in the literature that per-use and blanket mechanisms are but degenerate forms of the two-part (or multi-part) tariff system.]

B.3 ESTIMATING TRANSACTIONS COSTS

Although economic efficiency can be improved by the institution of per-use charges, it is obvious that some resources must be used to collect these charges. These "transactions costs" that are associated with an "exclusion mechanism" may be a negligible or significant sum relative to the charges that are imposed. In this section, we shall develop alternative estimates of their magnitude.

Exclusion mechanisms are the procedures by which one can determine who is using a good or service and then bill them for that usage. The difficulties of establishing such mechanisms have been cited as part of the rationale for the collective provision of public goods. At the present time there is a large but unknown amount of photocopying of

copyrighted works. The following estimates are cited merely to shed some light on the magnitude and distribution of photocopying.[3]

1. 27.5 billion paper copies were made by photo-copiers and photo-duplicators in the U.S. in 1967.

2. Approximately 60 percent of the material copied by libraries is copyrighted.

3. Of the photocopying done in libraries:

   a. the journal-to-book ratio was 9:1;

   b. the majority of items were scientific and technical;

   c. over 80 percent was less than five years old;

   d. 5 percent of the publishers produced 40 percent of the material being copied.

Currently, almost none of this photocopying results in an associated royalty payment or license fee.

A similar situation exists with the use of computer data bases. These data bases may contain scientific, economic or statistical data, bibliographic material, or medical and legal information. In many cases the data has associated with it computer software to facilitate access and use. There are a variety of existing agreements by which the creator of the data base collects for its use either directly from the customer or from one or more of the computer system operators who provide access to the data base.

As we described above, in both the photocopying and computer data base areas the economic issues are the comparative efficiencies of free provision versus the implementation of user charges, and the relative magnitudes of the collection and enforcement costs (the transactions costs).[4] These costs will depend on whether blanket licenses or per-use licenses are utilized.

The obvious archetypes of the blanket license are those employed by the performing rights societies (e.g., ASCAP and BMI). Here, a clearinghouse is employed to facilitate the contracting arrangements. The proposed Australian copyright royalty collection operation that resulted from the Morehouse decision will operate in a similar manner. (The decision in the Morehouse case was that libraries in Australia are responsible and liable for photocopying of copyrighted works done on in-library copying machines.)

Usually ASCAP's operating costs are less than 20 percent of revenue. The Australian publishers association has predicted that the costs of their monitoring activity, analysis, and transactions will be

approximately A$.01 per page (one Australian cent per page).[5] In both systems, a significant part of the cost is the monitoring of usage (what is performed or copied) so that the revenues can be divided among the copyright holders.

In looking for archetypal billing and collection systems for per-use charges, we found two different industries with well-developed and possibly interesting accounting and billing mechanisms, computer "service bureaus" and local telephone operating companies. One large service bureau organization estimated that the costs of monitoring use, accounting, billing, etc., generally are 15 to 18 percent of total costs. On the other hand, Pacific Telephone Company (which has complex multi-message unit charges for local calls) records shows that all accounting operations amounted to only 3 percent of company expenses for 1975. (Both the Accounting Department expenses and total expenses included all current and capital items. See Fig. B.1.)

The greater the amount of information collected, stored, and analyzed, the higher the costs. For example, New York Telephone does not, as a rule, itemize "message unit" calls on either residential or business customer bills. However, now they must provide such a list to the customer on demand if the customer is willing to pay the extra cost ($1.50 for residential customers and $1.50 plus $.25 per each extra page for business customers).[6]

An important point to remember is that in neither case do these costs include the expense of determining how to pay out the revenues. These disbursement costs will be related to the degree of accuracy required (i.e., sampling vs. 100 percent monitoring) and the frequency distribution of the copyright holders. Recent data from the British Lending Library (BLL) indicates the skewed nature of the frequency distribution.[7] Their survey indicated that of 14,967 serial titles, the top 210 titles accounted for 20 percent of the demand for photocopies and the 6,000 least requested titles accounted for the last 10 percent of the demand.[8] The cumulative distribution curve is shown in Figure B.2. Figure B.3 lists the 15 most "popular" titles.

Although the BLL is a "library of last resort" for academic libraries, it is a major resource for the specialized industrial libraries who comprise a majority of their borrowers. Therefore, we can assume that, although the BLL data may not characterize the photocopying in the U.S. in an unbiased manner, the U.S. data will also exhibit a high degree of skewness. Depending on the exact nature of the payment algorithm, this skewness can lead to either lower or higher costs in the distribution of royalties to copyright holders. The existence of a high threshold number of copies per time period -- unless X copies per month are made, no royalty payments are distributed -- coupled with the skewed distribution could reduce transaction costs in the same way that "deductibles" do for an insurance policy. On the other hand, in the absence of a threshold number, quite large samples may be required to capture the copying of the more obscure works.

FIGURE B.1

PACIFIC TELEPHONE COMPANY EXPENSES
1975 - 1978

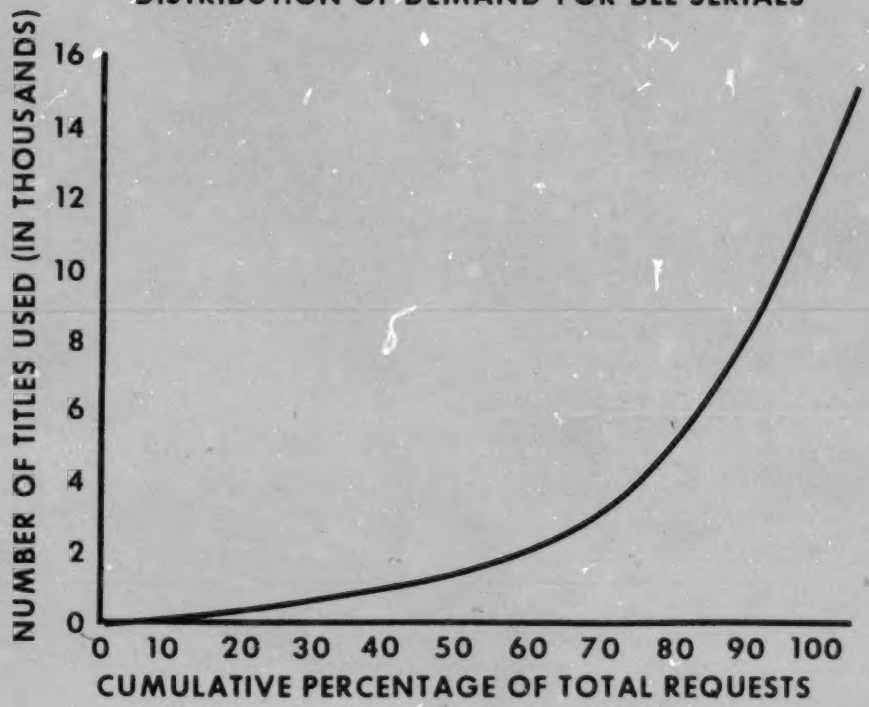
Year	Pacific Company ($bil)			Accounting Department ($bil)			Accounting Dept. as % of Company
	Expense	Capital	Total	Expense	Capital	Total	Total
1975	$2.2814	1.0019	3.2203	91.7	1.2*	92.9	2.9%
1976f	2.5237	1.1214	3.6451	114.6	0.9*	115.5	3.2%
1977f	-	1.2424	-	113.3	0.5	113.8	-
1978f	-	1.3689	-	-	0.3	-	-

Notes: f = forecast.

*regional toll centers opened in 1975 and 1976.

Source: Conversation with Pacific Telephone Company July 1976.

FIGURE B.2
DISTRIBUTION OF DEMAND FOR BLL SERIALS



Source: M. B. Line and D. N. Wood, "The Effect of a Large-Scale Photocopying Service on Journal Sales," Journal of Documentation 31 (1975).

FIGURE B.3
TOP 15 TITLES REQUESTED AT BLL
1972 - 1975

Rank Order	Title	Estimated No. of Photocopies p.a. of Articles in Print	Circulation (as given by Ulrich 1973/4)
1.	Science	1,288	154,200
2.	Biochimica et Biophysica Acta	1,078	4,500
3.	New England Journal of Medicine	959	140,000
4.	Annals, New York Academy of Sciences	917	
5.	Nautre	854	21,000
6.	Journal, American Chemical Society	798	
7.	Journal of Biological Chemistry	784	7,200
8.	Analytical Chemistry	700	36,000
9.	Journal, American Medical Association	700	239,000
10.	Clinical Chemistry	693	7,505
11.	Proceedings, National Academy of Sciences	679	8,600
12.	Scientific American	630	500,700
13.	Journal of Chromotography	623	
14.	Analytical Biochemistry	609	
15.	British Medical Journal	595	84,748
	Lancet	595	221,577[a]
			29,366[b]

[a]North American edition.

[b]British edition.

Source: M.B. Line and D.N. Wood, "The Effect of a Large-Scale Photocopying Service on Journal Sales," Journal of Documentation, 31:241 (1975).

B-9

B.4 REFERENCES

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2. The desirability of two-part tariffs from the standpoint of both profits and consumers' welfare is demonstrated in R. D. Willig, "The Pareto Domination of a Uniform Price by a Non-linear Outlay Schedule," mimeo, Bell Laboratories, Holmdel, New Jersey (1976).

3. All are taken from N. L. Henry, "Copyright, Public Policy and Information Technology," Science 183 (1974), 384-391.

4. One can also examine the income distribution effects, if any, of the alternative means of distribution.

5. Presentation of David Catterns to the National Commission on New Technological Uses of Copyrighted Works, Washington, D. C., December 19, 1975. Currently the rate of exchange is A$1.00 = U.S. $1.2[illegible] (September 1976).

6. New York Times (November 5, 1975), p. 54.

7. M. B. Line and D. N. Wood, "The Effects of a Large-Scale Photocopying Service on Journal Sales," Journal of Documentation 31:241 (1975).

8. Ibid., 239.

APPENDIX C1

ON THE OPTIMAL PROVISION OF JOURNALS QUA EXCLUDABLE PUBLIC GOODS: SUMMARY AND MAJOR FINDINGS

by

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*The views presented in this paper are solely those of the authors and do not necessarily represent those of New York University or Bell Laboratories.

In this paper we provide the theoretical model of a firm which produces a commodity that is sold both to individuals and to institutions. The latter extend the services of the commodity to a large collection of users. The focus of the paper is on the pricing rules that the firm should follow in calculating the prices for individual users and for institutional users. As the by-product of the analysis, we provide strong arguments for levying user charges on those who avail themselves of the institutionally-held unit of the commodity.

In the paper we use journal publishing as a perfect example of the industry which serves both individual and multi-user (institutional) markets. As we shall see, the analysis presented here can be extended rather easily to advanced computerized scientific and technological information systems.

The major problem raised in the paper is how the fixed cost component of the total production costs should be spread among the two classes of buyers. There already exists a well-established theory which bears directly on that issue. In brief, the theory prescribes that in the market in which demand is not very responsive to price changes, the price should be higher than the one charged to the buyers in the market in which the demand is highly responsive to price variations. This is known in the literature as the inverse elasticity rule, since demand elasticities are precisely the measures of responsiveness of demand to price changes. The implication of this inverse elasticity formula is that a proportionally larger share of the fixed cost should be shifted onto those buyers who do not substantially reduce their purchases when price is raised above some initial level.

This rule is, however, applicable only if there are no cross-market effects. But those effects are present whenever a change in the price charged in one of the markets affects the demand in the other market. If, for example, an increase in the institutional price leads some of the institutional buyers to discontinue their purchases, one would expect an increase in the demand by individuals. Our task in the paper is, therefore, to provide workable rules which would be applicable in the case of cross-market price effects since we believe that such effects are present in the industries which provide scientific and technical information.

The value of workable pricing rules or formulas, like the inverse elasticity rule, is two-fold. First, they enable the decision-maker to ascertain what variables in the model are of particular importance in the process of price setting. Second, they enable the decision-maker to conduct a rough test on how the current prices compare to those at which profits would be maximized.

It is, of course, unrealistic that the firm could ever hope to exactly set optimal (i.e., profit-maximizing) prices. Nevertheless, using the optimal price formulae as a guide, the management can concentrate on collecting that data which will be most useful in the process of setting prices. For example, as the name suggests, the inverse

elasticity formula identifies demand elasticities as being the focal points in the process of setting prices. Our analysis also uncovered additional variables which previously escaped the attention of the analysts. We find that in the model considered in the paper, the best (profit maximizing) prices are quite sensitive to the value of the variable which we term "the average number of potential subscribers". Roughly speaking, this variable measures the average number of additional private purchases that would be gained from those institutions that would discontinue their purchases in response to a small change in the institutional price of the commodity. To illustrate the concept, let us assume that an increase of one dollar in the institutional price induces six institutions to discontinue their purchases. This, in turn, induces two users from each institution to purchase the commodity. In this example, the average number of potential subscribers is two. If we were to change the hypothetical data somewhat and assume that there would be no new private buyers from four of those institutions, the value of the average number of potential subscribers would drop to two-thirds.

We have been able to show that if for a wide range of prices offered in the two markets the average number of potential subscribers exceeds one, the institutional price ought to exceed the private price irrespective of the elasticities of demand in the two markets. This result is of some interest because in some situations the values of the elasticities of demand in the private and institutional markets may not be known while the firm may have some information from its marketing surveys on the numbers of potential subscribers.

It must be admitted that sophisticated pricing rules like the one presented in this paper require significant amounts of information for their implementation. However, as we indicated earlier, the optimal price rules can be employed to test whether current prices can be improved upon yielding higher net income for the firm or higher net benefits for the product's users. For the purposes of this test much less detailed knowledge of market demands is required. The test is particularly simple for the firm which is not currently price discriminating between its institutional and individual customers. In this situation, it is very easy to show that in most circumstances price discrimination in favor of individual buyers would be desirable from the standpoint of profits and the welfare of the consumers as a whole. When the firm already has a two-tier price scheme, our tests enables the decision-maker to ascertain whether the current spread between the two sets of prices should be widened or narrowed.

There is no need to give here a detailed exposition of the price adjustment test since the test is described at great length in the paper. It is important, however, to reiterate that the procedure for price revisions developed in the paper relies wholly on the information that should be easily available to those responsible for price decisions. If such information is not currently available, it can be obtained from the existing data, using standard econometric techniques which we have discussed elsewhere.

It may be useful at this point to restate the motivation behind the analysis of Sections II and III of the paper. Our most abstract consideration was to extend the economic analysis of optimal pricing to those situations in which significant cross-market effects of pricing decisions are present. Although there are already some pricing rules which are applicable to that case, these rules are not easily interpretable even by a theorist. Furthermore, they are formulated in ways which are not particularly helpful to those who will in the end use them for actual pricing decisions. Hence, our second objective was to derive a set of guidelines to be followed by those who are responsible for deciding on prices for scientific and technical information. We strived to make a strong case for imaginative pricing and we argued that price discrimination between various classes of buyers is not only desirable for profits but perhaps paradoxically, also for the users of information as a whole.

Section II of the paper presents, we believe, a strong case for allowing the producers to employ sophisticated pricing policies and to have protection via copyright for their product. If the production of sceintific and technical information did not involve a fixed cost component, then economic theory would indicate prices closely to the incremental (marginal) production costs. When fixed costs are present, however, at prices equal to marginal costs, the firm cannot cover its total costs. Consequently, prices must deviate from incremental costs. In Sections II and III, we show what directions those deviations from marginal costs should take. It would be unfortunate if the producers and disseminators of information were to be prevented from employing those sophisticated pricing rules for the purposes of recovering their fixed costs.

Section V and Appendix I deal directly with the problem of whether user charges ought to be levied on those who use the institutionally owned excludable public good. This question is directly relevant to the discussion of copyright royalties. The first argument for user charges is entirely consistent with that encountered above. We argued earlier that the burden of defraying the fixed cost component of the total production costs should be allocated to the various classes of users according to well-defined principles (the inverse elasticity rule, for example). The question may be raised as to why the users of the institutionally-owned excludable public good should be exempted from sharing in that burden. The answer is, of course, that they should not. It is conceivable that those user charges should be "low". But our theory says that if those charges should be low, it is not necessarily because the cost to the society of an additional use of the institutionally owned excludable public good is also very small, perhaps even zero. Rather, the argument for no user charges ought to be based on the empirically verifiable proposition that the demand for institutional use is highly elastic with respect to user charges. (This demand should not be confused with the demand by institutions for the commodity in question. Undoubtedly, the two demands are related in some way.) When a small increase in these charges above zero would discourage so many users

that the additional revenue gained from user charges would not be sufficient to justify the collection costs, user charges are not desirable. It is those who oppose the introduction of user charges, however, who must provide a positive showing that the collection costs are prohibitive, for otherwise the implications of economic analysis are quite clear: carefully structured user fees are a rational and desirable method of defraying at least some part of the fixed costs incurred in production and dissemination of scientific and technical information.

The second argument for user charges is less complex. An imposition of user charges would discourage some use of the units of the commodity owned by the institutions. Some of these discouraged users would enter the private market. By increasing private demand, they would stimulate production of the commodity, thus driving down its average cost. Some of those gains could then be passed on to the buyers in the form of lower prices, yielding concomitant improvement in the dissemination of the product.

The reader will have noted that in this summary of the paper, we have dealt with the class of excludable public goods. The discussion in the paper is couched specifically in terms of scientific and technical journals. We differentiated in the paper between personal and library subscriptions and argued strongly for the imposition of user charges on those who utilize the library copy by, for example, photocopying articles from a journal. We built our argument on a very general proposition which asserts that no group of consumers should be exempted from financing some part of production costs unless reasons of equity, costly collection, or significant positive externalities stop us from doing so. The formulae for prices presented in the paper apply when those objections to the use of prices as rationing devices are not present.[1]

Those formulas and the arguments behind them apply not only to journals. Instead of journals, we can imagine a system in which the publishers do not provide hard copy to the subscribers but rather video discs or tapes of journals. Those discs or tapes can then be read using minicomputers and/or display consoles. In such a hypothetical system, we would again have at least two-tier price structure: one

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[1]See J.A. Ordover and R.D. Willig, "On the Role of Information in Designing Social Policy towards Externalities," Center for Applied Economics, Discussion Paper #76-03, New York University, for the discussion of the case in which there are external effects. Those effects exist whenever the societal benefit from a given activity exceeds the private benefit that accrues to the person who undertakes that particular activity. It may be argued that the users of scientific and technical information generate significant positive externalities. If so, then perhaps information should be made freely available to all users and not only to those who use it in the library.

price for individual subscribers and another for institutional subscribers including libraries. In addition, in accordance with our theoretical analysis, user charges will be levied as well. Indeed, in this modified system, user charges are even more desirable than in the presently extant system. This is so because the collection costs would be much lower if the information were transmitted through computer.

APPENDIX C2

ON THE OPTIMAL PROVISION OF JOURNALS QUA EXCLUDABLE PUBLIC GOODS

by

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*The views presented in this paper are solely those of the authors and do not necessarily represent those of New York University or Bell Laboratories. Authors' names are in alphabetical order.

TABLE OF CONTENTS

SECTION	DESCRIPTION	PAGE
I.	Introduction.	C2-3
II.	Optimal Subscription Prices	C2-6
III.	Determining Best Price Adjustments From Current Data	C2-14
IV.	Profit and Welfare-Optimal Choices of Provision Modes.	C2-20
V.	Welfare and Profit Effects of Library Usage Fees.	C2-24
Appendix 1.	The Ramsey Suboptimality of Perfect Purveyance of Excludable Public Goods	C2-32
Appendix 2.	Multidimensional Characterization of Library Populations.	C2-35
Footnotes		C2-38
References.		C2-40
Figures		C2-41

I. Introduction

There are many interesting and important policy issues surrounding the provision of technical journals that arise from the simple fact that journals can, at once, be offered to the reading public through libraries and through personal subscriptions. It is said, for example, that publishers are experiencing increasing difficulty in recovering their "first copy costs" (set-up costs) due to the rapid growth of reprography. Recognition of this new problem has lead to intense public debate over copyright protection against uncompensated private dissemination of reproduced library materials.[1] There is a related accelerating trend towards the establishment of a dual pricing structure by publishers -- high rates for library subscriptions and lower rates for personal ones.

In this paper we analyze the socially optimal provision of such goods as journals which can be viably used in either the private or public modes. This is the class of "excludable public goods," which we take to be characterized by the following canonical properties:

(a) There exists a technology of public provision of the good under which the marginal user costs are zero.

(b) The good can be replicated, so that private provision is feasible.

(c) The subjective value of the good to consumers is greater in the private mode than it is in the public mode.

Properties (a) and (b) together say that the good can be feasibly offered to consumers in either or both modes. We define the public mode as the uncongested use of a single unit of the good by many consumers, irrespective of whether or not a user fee is levied. In contrast the private mode presupposes exclusive use of a unit of the good by each consuming agent. Of course, if consumers were indifferent between obtaining the good in the two modes, then consideration of profit or social welfare would dictate the production of only a single unit to be shared by all users, and the standard public goods analyses would apply unchanged.

It is property (c) that captures the hitherto analytically ignored characteristic of journals which leads to its bifurcated provision and to the concomitant policy issues.[2] Given (c), there is a tradeoff between the convenience of the private mode and the economy of the public one. Theoretical and practical questions arise as to the determination of the modes of delivery and the associated prices that are optimal for welfare and for profits. These are the central concerns of this study. Throughout the paper, to make our analysis

Note: Superscripts refer to Footnotes beginning on page C2-38. Bracketed numbers refer to References beginning on page C2-40. Numbers in parentheses refer to equations in the text.

clearer and more relevant to current policy issues, we cast our discussion in terms of journals. Nonetheless, our results apply to any excludable public good.

We work with the simplest model rich enough to reflect these issues. Each agent is characterized by his benefit from consuming the good via the private and public modes, B and B - T respectively. Thus T is the money-scaled subjective cost of patronizing the public mode over and above that of the private mode. For example, T might measure the inconvenience of library use.

The set of all agents is exogeneously partitioned into heterogeneous groups, each served by at most one public facility (library). The joint distribution of B and T in the group with characteristics vector m is given by h(B,T,m), while the distribution of m over all groups is f(m).

We assume that the production technology of the good exhibits increasing returns to scale. Thus, with C(Q) denoting the cost of producing Q units, $C(Q) > QC'(Q)$; the revenue from marginal cost pricing cannot cover production cost. This assumption reflects the setup costs significant for public policy towards the publishing industry. We abstract, however, from costs of library operation and construction and from the concomitant overhead allocation problem. Thus, we assume that every group of agents has access to one and only one already established and noncongested library facility, and we focus on the potential acquisitions by the libraries of a particular journal.

Section II studies the personal and institutional subscription prices that are optimal for profits and that are optimal for welfare under the Ramsey nonnegative profit constraint.[2] Here we assume that libraries are perfect (Samuelsonian [10]) purveyors of the public good to their user populations. That is, they levy no use fee and they finance their acquisitions through lump sum contributions. Further, a library subscribes to the journal if and only if the total willingness to pay of its population exceeds the institutional subscription price. This model gives special structure to the market demand elasticities which are crucial for the determination of the optimal prices.

We see that the ratio of the optimal deviations of the prices from marginal cost depends on the ratio of the own price elasticities of library and personal subscription demand, the ratio of library to personal subscriptions, and, the newly identified variable, the average number of potential personal subscribers who are users of the marginal libraries. However, the application of this Ramsey rule requires global information on the behavior of these critical functions of the prices. Unfortunately such data are unavailable.

Therefore, in Section III, we study the use of current values of the variables for the determination of the local price adjustments

which are best for welfare, while leaving profit unchanged.[4] The same expression for the ratio of the deviations of Ramsey optimal prices from marginal cost can, when evaluated at current prices, be meaningfully compared with the ratio of current deviations. In particular, for reasonable and representative values of the current parameters, a journal currently setting equal personal and library subscription prices should move to a higher relative library price. Using analogous tools, it is shown that such a move would also be of benefit to a profit oriented publisher.

We apply these methods in a pilot study of the 1975 prices of five economics journals. We find that for four of them, welfare can be improved without loss of publisher profit by simultaneously increasing the library subscription price and decreasing the personal subscription price. Further, the hypothesis of profit maximization can be rejected for these journals.

In Section IV we investigate the profit and welfare optimal distribution structures. Numerical simulations show, for example, that profit maximization can lead to total exclusion of private subscriptions when break-even constrained welfare maximization implies the complete exclusion of library subscriptions. We identify some of the qualitative factors that generate such divergences between the profit and welfare optimal distribution structures. The total welfare loss from monopoly provision can be decomposed into the components which are attributable to incorrect prices and to incorrect structure. In the aforementioned example, it is the latter which are most significant. Generally, however, the welfare effect of constraining a profit maximizing publisher to provide the welfare optimal distribution modes can be negligible, or worse, perverse.

In Section V we study the economic impact of the introduction of a library usage fee, paid to the publisher, perhaps as a copyright royalty. We show that under weak and plausible conditions, net welfare, consumer welfare, and profits can all be increased by the implementation of such a fee, when accompanied by appropriate decreases in the subscription prices. Thus, we identify the difficult policy problem of how to tie such price decreases to the extension of copyright protection to library usage.

Appendix 1 shows the Ramsey suboptimality of the libraries behaving as perfect purveyors of their public good journal copies. While each population prefers to finance library subscriptions with lump-sum taxes, they all benefit from collective adherence to a rule specifying that usage fees partially finance library acquisitions.

Throughout the paper, the analysis is performed with library populations indexed by a scalar, m, over which the relevant functions are assumed to be monotone. Appendix 2 shows how this model can be considerably extended to allow for a multidimensional characterization of library populations, without any loss of the analytic power of the

one dimensional representation. We feel that the analytic techniques presented in Appendix 2 can be used to gainfully enrich diverse one dimensional models found in the literature.

II. Optimal Subscription Prices

In this section we determine the rules that characterize the profit and constrained welfare optimal personal and institutional prices under the assumption that the institutions are perfect purveyors of the excludable public good to their populations. We build up from a detailed model of individual behavior.

Each agent is described by three characteristics: the unique library population to which he belongs, his benefit, B, measured in money units, from the use of a library copy of a journal, B - T. Thus T can be interpreted as the money value of all psychic and pecuniary costs of using the library, exclusive of any user fees. B and B - T are income independent and, as such, are also independent of any money expended for personal subscription, use fees, or lump-sum library taxes. (That is, utility functions are linear in money.)

Each agent faces a personal subscription price, p_s. If he belongs to a group whose library does not own the journal, he will subscribe himself if and only if $B \geq p_s$. If, however, he does have access to a library copy, then his chosen mode will be the one yielding the highest net benefit. He will buy a personal subscription if $B \geq p_s$ and $T \geq p_s$ ($B-p_s \geq B-T$). He will be a library reader if $B - T \geq 0$ and $T \leq p_s$. Otherwise, he will choose not to read the journal.

It will be useful to dichotomize the library readers into the potential subscribers, for whom $B \geq p_s$ and $T \leq p_s$, and the perusers, for whom $B < p_s$ and $T \leq B$. The latter group, unlike the former, would not buy personal subscriptions at p_s, were the library to discontinue its subscription. Figure 1 depicts the aforementioned groups as regions in B, T space.

The library indexed by the parameter m serves a group of agents characterized by the histogram function h(B,T,m). The library, acting as a perfect purveyor, will subscribe if the aggregate willingness to pay, WP, of its population covers the institutional subscription price p_L. WP can be expressed as the difference between the population's aggregate net benefits with ($\overline{V}$) and without ($\underline{V}$) the library subscription exclusive of the lump sum payments which sum to p_L.

(1)

$$\overline{V}(p_s,m) = \int_{p_s}^{\infty}\int_{p_s}^{\infty}(B-p_s)h(B,T,m)dTdB + \int_{p_s}^{\infty}\int_{0}^{p_s}(B-T)h(B,T,m)dTdB$$

$$+ \int_{0}^{p_s}\int_{0}^{B}(B-T)h(B,T,m)dTdB.$$

Reading left to right, the integrals measure the net benefits of the personal subscribers, the potential subscribers, and the perusers, respectively.

(2) $$\underline{V}(p_s,m) = \int_{p_s}^{\infty}\int_{0}^{\infty}(B-p_s)h(B,T,m)dTdB$$

Here, without a library subscription, the only readers are those with personal subscriptions. Finally,

(3) $$WP(p_s,m) = \overline{V}(p_s,m) - \underline{V}(p_s,m) = \int_{0}^{p_s}\int_{0}^{B}(B-T)h(B,T,m)dTdB$$

$$+ \int_{p_s}^{\infty}\int_{0}^{p_s}(p_s-T)h(B,T,m)dTdB.$$

Thus, the personal subscribers contribute nothing to WP, and the perusers are willing to pay their full benefit, net of inconvenience, B - T. However, the potential subscribers add only the difference p_s - T between their evaluations of the library inconvenience and the money cost of a personal subscription.

Using the willingness to pay concept, we can identify the libraries which are just indifferent to acquiring the journal. Such marginal libraries will be denoted by the index m*, with

(4) $$WP(p_s,m^*) = p_L.$$

For convenience, we take m to be a scalar index defined so that the WP function is increasing in m. (In Appendix 2 we show how to arrive

at our results with a mathematically more satisfying representation of multidimensionally differentiated libraries.) Letting f(m) be the number of population groups with characteristic m,

$$N^L = \int_{m^*}^{\infty} f(m)dm \tag{5}$$

is the total number of subscribing libraries.

Denoting by N^S the total number of personal subscribers, publisher profits are

$$\pi = p_S N^S + p_L N^L - C(N^S + N^L). \tag{6}$$

Total social welfare generated by the journal in question, given by the sum of producer's surplus and consumers' surplus,[5] is denoted by $W = V + \pi$, where

$$V = \int_{m^*}^{\infty} (\overline{V}(p_S,m) - p_L)f(m)dm + \int_0^{m^*} \underline{V}(p_S,m)f(m)dm. \tag{7}$$

Now, we can turn to the choice of p_S and p_L which maximizes W subject to the constraint that $\pi \geq 0$. Forming the Lagrangian, $\mathcal{L} = W + \lambda\pi = V + (\lambda+1)\pi$, we investigate the necessary first order conditions for positive optimal prices:

$$\frac{\partial \mathcal{L}}{\partial p_S} = \frac{\partial V}{\partial p_S} + (\lambda+1)\frac{\partial \pi}{\partial p_S} = 0 \tag{8}$$

and

$$\frac{\partial \mathcal{L}}{\partial p_L} = \frac{\partial V}{\partial p_L} + (\lambda+1)\frac{\partial \pi}{\partial p_L} = 0.$$

Calculating from (7), (2), and (1), we have

$$\frac{\partial V}{\partial p_L} = -\int_{m^*}^{\infty} f(m)dm - \frac{\partial m^*}{\partial p_L}[\overline{V}(m^*) - \underline{V}(m^*) - p_L]f(m^*).$$

However, because of the definitions of m* and WP, (3) and (4), the second term is zero and we are left with this familiar version of Roy's Law[6]

$$(9) \qquad \frac{\partial V}{\partial p_L} = -N^L.$$

Similar calculations yield

$$(10) \qquad \frac{\partial V}{\partial p_S} = -N^S.$$

Routine differentiation of the profit function (6) gives this solution to the simultaneous equations of (8), where c denotes the marginal cost $C'(N^S+N^L)$:

$$(11) \qquad \begin{pmatrix} p_L - c \\ p_S - c \end{pmatrix} = \frac{-\lambda}{\lambda+1} \left(\frac{1}{N_L^L N_S^S - N_L^S N_S^L} \right) \begin{bmatrix} N_S^S & -N_L^S \\ -N_S^L & N_L^L \end{bmatrix} \begin{pmatrix} N^L \\ N^S \end{pmatrix}.$$

Here, subscripts S and L denote partial derivatives with respect to p_S and p_L. Of course (11) is the standard Ramsey rule for optimal deviations of prices from marginal costs under the nonnegative profit constraint.[7] If the cross demand partials are zero, then (11) reduces to the familiar inverse elasticity rule.[8] In the present form, (11) is not very illuminating. A more useful formulation can be derived by substituting into it detailed relationships among the partial derivatives of demand extracted from the underlying model.

Working from (5), we obtain

$$(12) \qquad N_L^L = -\frac{\partial m^*}{\partial p_L} f(m^*) \quad \text{and} \quad N_S^L = -\frac{\partial m^*}{\partial p_S} f(m^*).$$

Implicit differentiation of (4) gives

$$(13) \qquad \frac{\partial m^*}{\partial p_L} = \frac{1}{\frac{\partial WP}{\partial m}}, \quad \frac{\partial m^*}{\partial p_S} = -\frac{\frac{\partial WP}{\partial p_S}}{\frac{\partial WP}{\partial m}},$$

and

$$\frac{\frac{\partial m^*}{\partial p_S}}{\frac{\partial m^*}{\partial p_L}} = -\frac{\partial WP}{\partial p_S}$$

Note that $\frac{\partial WP}{\partial m} > 0$, by construction, so that (12) and (13) imply that $N_L^L < 0$. Turning back to the definition of WP in (3), we calculate

$$\frac{\partial WP}{\partial p_S} = \int_{p_S}^{\infty} \int_{0}^{p_S} h(B,T,m^*)dTdB \equiv PN^S(m^*). \tag{14}$$

This is just the number of potential subscribers who frequent each marginal library. Together, (12), (13), and (14) yield

$$N_S^L = - PN^S(m^*)N_L^L \geq 0. \tag{15}$$

The number of personal subscribers in a population, m, with a subscribing library is

$$\overline{N^S}(m) = \int_{p_S}^{\infty} \int_{p_S}^{\infty} h(B,T,m)dTdB, \tag{16}$$

and, without a subscribing library,

$$\underline{N^S}(m) = \int_{p_S}^{\infty} \int_{0}^{\infty} h(B,T,m)dTdB. \tag{17}$$

Differentiating the total number of private subscribers,

$$N^S = \int_{0}^{m^*} \underline{N^S}(m)f(m)dm + \int_{m^*}^{\infty} \overline{N^S}(m)f(m)dm, \tag{18}$$

with respect to p_L, which affects only the set of subscribing libraries,

(19)

$$N_L^S = \frac{\partial m^*}{\partial p_L} f(m^*)[\underline{N}^S(m^*) - \overline{N}^S(m^*)]$$

$$= \frac{\partial m^*}{\partial p_L} f(m^*) \int_{p_S}^{\infty} \int_0^{p_S} h(B,T,m^*)dTdB = \frac{\partial m^*}{\partial p_L} f(m^*)PN^S(m^*).$$

Now, together with (15) and (12), (19) reveals that

(20) $$N_L^S = N_S^L = - PN^S(m^*)N_L^L \geq 0.$$

The relationships in (20) are both surprising and useful. Personal and library subscriptions are gross substitutes, provided there are potential subscribers in the marginal libraries.[9] Despite the fact that the demand for library subscriptions is determined by the simultaneous collective decisions of many population groups, while N^S results from the individual decisions of the agents, the Slutsky symmetry of the demand cross-partials (with no income effects) is preserved.

It remains only to investigate the behavior of N^S with respect to changes in p_S. Working from (18),

(21) $$N_S^S = \frac{\partial m^*}{\partial p_S} f(m^*)(\underline{N}^S(m^*) - \overline{N}^S(m^*))$$

$$+ \left[\int_0^{m^*} \underline{N}_S^S(m)f(m)dm + \int_{m^*}^{\infty} \overline{N}_S^S(m)f(m)dm \right].$$

We denote by $\hat{N}_S^S$ the negative terms in the brackets which represent the derivative of N^S with respect to p_S, holding constant the set of subscribing libraries. Using (13), (14), and (19), we have

$$\frac{\partial m^*}{\partial p_S} f(m^*)(\underline{N}^S(m^*) - \overline{N}^S(m^*)) = -N_S^L PN^S(m^*).$$

Thus, (21) can be rewritten

(22) $$N_S^S = - N_S^L PN^S(m^*) + \hat{N}_S^S \leq \hat{N}_S^S < 0.$$

Together, (22) and (18) yield considerable insight into the structure of demand and the optimal prices. Note first that the Jacobian,

$$\begin{bmatrix} N_S^S & N_L^S \\ N_S^L & N_L^L \end{bmatrix}$$

of the map giving N^S and N^L as functions of p_S and p_L is an NP matrix (i.e., the principal minors alternate in sign from negative, for the 1x1 minors, to positive). This is so because both N_S^S and N_L^L are negative and, using (20) and (22),

(23)

$$\begin{vmatrix} N_S^S & N_L^S \\ N_S^L & N_L^L \end{vmatrix} = N_S^S N_L^L - N_L^S N_S^L$$

$$= N_L^L \left[\hat{N}_S^S + (PN^S(m^*))^2 N_L^L \right] - N_L^L (PN^S(m^*))^2 = N_L^L \hat{N}_S^S > 0.$$

Thus, the interrelated demands for library and personal subscriptions are "normal" in the sense of Sandberg [11]. If p_S and p_L change, the demand for at least one of the goods moves normally, in the opposite direction to the movement in its price. For example, if both prices rise, both demands cannot simultaneously increase. We think the fact that N^S and N^L comprise a normal demand system is a confirmation of the plausibility and applicability of the model. Further, the NP property of the demand Jacobian may be a useful restriction on estimated demand equations.

Turning to the optimal price rule, we note first that at the profit constrained welfare optimum, both p_S and p_L are strictly above the marginal cost, c. This follows from (11) in that $N_S^S N^L - N_L^S N^S < 0$ and $-N_S^L N^L + N_L^L N^S < 0$; $N_L^L N_S^S - N_L^S N_S^L > 0$, by (23); and finally $\lambda \geq 0$ by the Kuhn-Tucker conditions. Moreover, if λ were 0, $p_S = c = p_L$, which, by the assumed increasing returns, would leave costs uncovered and violate the constraint $\pi \geq 0$. Thus $\lambda > 0$, $p_S > c$ and $p_L > c$.

Now we can delve into the determination of the optimal ratio, $\rho \equiv \frac{p_L - c}{p_S - c}$, and rewrite the basic equation (11) several ways to expose the roles of the underlying variables of the model. Rearrangement of

(11) yields:

$$\rho \equiv \frac{p_L - c}{p_S - c} = \frac{N_S^S N^L - N_L^S N^S}{N_S^L N^L + N_L^L N^S} \equiv \psi \,. \tag{24}$$

Using (22),

$$\rho = \frac{N^L\left(\hat{N}_S^S - N_S^L PN^S(m^*)\right) - N_S^L N^S}{-N_S^L N^L + N_L^L N^S} \,. \tag{25}$$

Now, substituting (20) into (25) and rearranging yields

$$\rho = PN^S(m^*) + \frac{\hat{N}_S^S}{N_L^L}\left(\frac{N^L/N^S}{1 + PN^S(m^*)N^L/N^S}\right). \tag{26}$$

It follows that

$$PN^S(m^*) < \rho \leq PN^S(m^*) + \frac{\hat{N}_S^S}{N_L^L}\frac{N^L}{N^S} \,.$$

Thus, $PN^S(m^*) \geq 1$ would immediately imply that $\rho > 1$, that the optimal library price exceeds the optimal personal subscription price.

Now, to contrast the formula for ρ with the classic inverse elasticity rule, divide the numerator and denominator of (24) by $N^S N_L^L$ and use (20) to get

$$\rho = \psi \equiv \frac{\dfrac{N_S^S/N^S}{N_L^L/N^L} + PN^S(m^*)}{1 + PN^S(m^*)\dfrac{N^L}{N^S}} \,. \tag{27}$$

Of course, if $PN^S(m^*) = 0$, then the cross-elasticities vanish and

$$\frac{(p_L - c)/p_L}{(p_S - c)/p_S} = \frac{\epsilon_S^S}{\epsilon_L^L} \,, \quad \text{where } \epsilon_S^S = N_S^S p_S / N^S$$

and

$$\epsilon_L^L = N_L^L p_L / N^L .$$

Otherwise, the needed modifications in (27) require only the number of potential subscribers and the ratio of the number of library to personal subscriptions.

III. Determining Best Price Adjustments from Current Data

There is considerable methodological difficulty in deriving from (26) and (27) insights that are relevant to current practices of journal pricing. The variables (elasticities, circulations, and number of potential subscribers) to which the formulae relate p are all to be evaluated at the to-be-determined prices. This endogeneity, endemic to necessary first order conditions, means that the optimal prices can only be determined as the solutions to simultaneous equations whose global behavior is almost impossible to deduce from available local data. Further, intuitions that we may have concerning current values of the variables governing ρ cannot be logically utilized via such first order conditions as (26) and (27) to illumine the optimal prices. We cannot use a comparison, for example, of $(N_S^S/N^S)/(N_L^L/N^L)$ across journals to deduce from (28) a comparison of the corresponding optimal values of ρ. The relevant quantities to compare, holding other components of (27) equal, are the values of $(N_S^S/N^S)/(N_L^L/N^L)$ at the different optima. But these, themselves, are the objects of interest.

Fortunately, there is an analytic line of inquiry which circumvents these conceptual difficulties. We can ask for the direction of change from the current prices which is best for social welfare while preserving the current level of profit. It can be shown[10] that if the current $\rho = \frac{p_L - c}{p_S - c}$ is greater than the current value of ψ (defined in (24)), then the best, profit constrained, direction of change required that p_L be lowered and p_S be raised. Inversely, if, at current levels, $\rho < \psi$, then p_L should be raised and p_S lowered. It should be emphasized that these calculations do not necessarily indicate the relationships between the current and the optimal prices. Instead, they give the best local price adjustments that can be determined from strictly local information on the relevant functions.

From this point of view, ψ, calculated at current values of the variables, can indeed be meaningfully compared with the current ratio $\frac{p_L - c}{p_S - c}$. Since both (26) and (27) give expressions equal to ψ, they can serve as vehicles for the application of current data to the study of

present journal prices, yielding recommendations for the best direction of change. It now becomes meaningful to investigate the behavior of ψ with respect to its component variables. This is not the standard comparative statics technique which requires consideration of the feedback between the underlying parameters and the consequent optimum at which the equations are evaluated. Instead, we study the level of ψ, always evaluated at current prices, as a function of the values its parameters could take on as they pertain to different journals. Here, these parameters need not be viewed as functions of prices, as they must in comparative statics (with prices endogeneous), because the prices are themselves parametrically fixed at their currently realized values.

We shall first utilize this novel and powerful technique to establish conditions under which it can be unambiguously asserted that welfare would increase (without affecting profits) by introducing a positive margin between currently equal library and personal subscription prices. This assertion can be made if the current value of ψ for a particular journal, with $p_S = p_L$, exceeds 1. For this journal, the current ρ is equal to 1, less than ψ, indicating that p_L should be raised and p_S lowered.

For notational convenience, let

$$k \equiv \frac{\varepsilon_S^S}{\varepsilon_L^L}, \quad n = \frac{N^L}{N^S} \quad \text{and} \quad Z = PN^S(m^*) .$$

Using the representation of ψ given by the right hand side of (27),

$$\psi = \frac{\frac{p_L}{p_S} k + Z}{1 + Zn} , \tag{28}$$

which reduces to

$$\psi = \frac{k + Z}{1 + Zn}$$

when $p_L = p_S$.

Thus, $\psi > 1$ is equivalent to $(k-1) + Z(1-n) > 0$. This condition will be met whenever the circulation ratio, n, is less than 1 and the ratio of the elasticities, k, is greater than 1. The meager empirical evidence suggests that k is significantly larger than 2, for all journals studied.[11] Further, the best available data indicates that $n < 1$ for a majority of technical journals.[12] Thus a finding that $\psi > 1$ for a journal with $p_S = p_L$ would not be surprising, and the policy recommendation to differentiate the subscription prices, $p_L > p_S$, would be rigorously justified.

For journals already charging differentiated prices, the investigation of the best direction of price changes requires more current information. If k, n, and Z were known, then the test is just $\rho \gtrless \psi$. However, Z may be more difficult to estimate than are k or n. Nevertheless, we can use (28) to determine the minimum value of ψ, over all $Z \geq 0$, as a function of k and n. If for a particular journal it should be the case that $\rho < \psi_{min}$, then surely $\rho < \psi$ and the recommendation to increase p_L and decrease p_S would follow.

Holding p_L, p_S, k, and n constant, (28) shows that ψ is either monotone decreasing or increasing in Z as $(p_L/p_S)nk$ is greater or less than one. In the latter case, $\psi_{min} = (p_L/p_S)k$. In the former case, we need an upper bound on Z to establish a lower bound on ψ.

Together, (20) and (22) yield

$$0 > \hat{N}_S^S = N_S^S + N_S^L Z = N_S^S - Z^2 N_L^L .$$

Thus, $Z^2 < N_S^S / N_L^L = \frac{k}{n}\frac{p_L}{p_S}$, and

$$(29) \qquad Z < \sqrt{\frac{k}{n}\frac{p_L}{p_S}}$$

Substituting this uppen bound for Z into (28) gives

$$(30) \qquad \psi_{min} = \frac{\frac{p_L}{p_S}k + \sqrt{\frac{k}{n}\frac{p_L}{p_S}}}{1 + n\sqrt{\frac{k}{n}\frac{p_L}{p_S}}}, \quad \text{for } \frac{p_L}{p_S} nk \geq 1 .$$

Note further that the expression given for ψ_{min} in (30) is an increasing function of k. Hence a perceived lower bound on k can be substituted into (30) to yield ψ_{min} as a function of the directly observable values of p_L, p_S, and n. Moreover, by equating (30) to ρ, we can solve for the unique value of k, k*, for which $\rho = \psi_{min}$.

$$(31) \qquad k^* = \frac{p_S}{p_L} n\rho^2 .$$

It follows that if $k > k^*$, and if the condition for the validity of (30), $\frac{p_L}{p_S} nk \geq 1$, is satisfied, then $\rho < \psi_{min}$, and the ratio of p_L to p_S should be increased.

We now apply these methods in a pilot study of the 1975 prices of five economics journals: Quarterly Journal of Economics (QJE); American Economic Review, together with the Papers and Proceedings, and the Journal of Economic Literature (AER); Journal of Political Economy (JPE); Economic Inquiry (EI); and the Journal of Economic Theory (JET). The prices, taken from the public record, pertain to all issues published in 1975. For the association journals (AER and EI), p_S was taken to be the membership fee, and we ignore any benefits and costs of membership unrelated to the journal subscriptions. Circulation figures, N^L and N^S, were obtained directly from the editorial offices.[13] The marginal costs were calculated form the formula,[14]

$$\ell n \frac{C(Q)}{10{,}000} = -.825 + .564\, \ell n \left[\frac{N^S+N^L}{1000}\right] + .870\, \ell n \left[\frac{\text{annual pages}}{100}\right] ,$$

and then inflated by 25 percent.[15] These data appear in columns 1-6 of Table 1. Column 7 holds ρ, the ratio of the deviations of the subscription prices from marginal cost, which is to be compared with ψ.

For each of the five journals, $\frac{p_L}{p_S} nk > 1$ for $k \geq 2$, and so we can presume[16] that (30) applies. Column 8 lists the values of ψ_{min} computed from (30) with the underestimate of 2.0 used for k. Column 9 exhibits k*, the value of k which would make $\psi_{min} = \rho$.

These calculations suggest that ρ is indeed well below ψ for all the journals but JET. Both intuition and the evidence support the contention that the own price elasticity of personal subscriptions is more than twice that of library subscriptions. With $k > 2$, both columns 7 and 8 show that the values of ρ are below those of ψ_{min}. The policy conclusion [17] is that net consumer welfare can be increased, while the levels of publishers' profits are maintained, by simultaneously increasing p_L and decreasing p_S, for QJE, AER, JPE, and EI.

TABLE 1

1975	p_S	p_L	N^L+N^S	N^L/N^S	Pages	c	$\frac{p_L-c}{p_S-c}$	$\psi_{min}(k=2)$	k^*†
QJE	15.00	15.00	5,500	1.22	686	7.85	1.00	1.28	1.2
AER†	23.00	34.50	27,500	.37	3,280	15.18	2.47	2.85	1.5
JPE	15.00	20.00	8,400	.43	1,318	11.51	2.43	2.49	1.9
EI	14.00	20.00	3,800	.49	610	8.32	2.06	2.42	1.4
JET	34.50	69.00	1,500	4.30	873	17.05	2.98	.97	19.0

† Includes Papers and Proceedings and the Journal of Economic Literature.

† The value of k for which $\psi_{min} = \rho$.

For JET, Table 1 shows that it is unlikely that $\rho < \psi_{min}$. Since $\frac{p_L}{p_S} nk > 1$, ψ is decreasing in Z, and (28) yields $\psi_{max} = \frac{p_L}{p_S} k$. Since $\frac{p_L}{p_S} = 2$, $\rho < \psi_{max}$ for $k > 1.5$. Thus, for reasonable values of k, $\psi_{min} < \rho < \psi_{max}$, and we cannot reject the hypothesis that the subscription prices of JET satisfy the optimality conditions. In fact, rearrangement of (28) shows that $\rho = \psi$ if k and Z satisfy $k = 1.5 + 6Z$. It is certainly plausible, for example, that $Z = .5$ and $k = 4.5$.

Thus far we have studied welfare maximization, and our concern with profits has been restricted to the constraint of nonsubsidized viability of the publisher. However, these very same tools can also be usefully applied to the study of profit maximization.

The first order conditions for the choice of p_L and p_S which is optimal for profits can be expressed as

$$(32) \qquad \begin{bmatrix} p_L - c \\ p_S - c \end{bmatrix} = \left[\frac{-1}{N_L^L N_S^S - N_L^S N_S^L} \right] \begin{bmatrix} N_S^S & -N_L^S \\ -N_S^L & N_L^L \end{bmatrix} \begin{bmatrix} N^L \\ N^S \end{bmatrix} .$$

This matrix equation can be derived from (11) by letting $\lambda \to \infty$. This follows heuristically from observing that as λ grows large, the $\lambda\pi$ term dominates the W term in the Lagrangian underlying (11), and, in the limit, maximization of L is tantamount to the maximization of π.

It is evident from (32) that a necessary condition for the current levels of p_L and p_S to be profit optimal is that $\rho = \psi$. Thus the results displayed in Table 1 can be interpreted as evidence that all the journals but JET are neither successful profit maximizers nor constrained welfare optimizers.

However, with the profit objective function, inequality between ρ and ψ cannot be utilized to determine the best direction of price change without either further information or additional assumptions. Algebraic manipulation of (32) reveals that

$$(33) \qquad \rho \gtrless \psi \quad \text{as} \quad N^L \frac{\partial \pi}{\partial p_S} \gtrless N^S \frac{\partial \pi}{\partial p_L} .$$

One interesting application of (33) concerns a publisher who is currently charging a profit optimal nondiscriminating price ($p_S = p_L$ and $\rho = 1$). At these equal prices, $\frac{\partial \pi}{\partial p_S} + \frac{\partial \pi}{\partial p_L} = 0$. It follows then from (33) that if, at current values, $\psi > 1 = \rho$, then $\frac{\partial \pi}{\partial p_L} > 0$ and $\frac{\partial \pi}{\partial p_S} < 0$. In such a case, increasing p_L and decreasing p_S would definitely increase profits.

Together, (32) and (11) show that prices which are profit optimal and prices which are profit constrained welfare optimal both satisfy the condition $\rho = \psi$. However, it is also evident from the equations and from common intuition that the former prices will both be larger than the latter. Of course, this is a reflection of the well-known welfare loss due to profit maximizing monopoly behavior.

IV. Profit and Welfare Optimal Choices of Provision Modes

In the present context, new and significant questions arise: Is there an additional welfare loss caused by the monopolist choosing a socially suboptimal set of provision modes? Will the monopolist refuse to make the journal available to libraries or perhaps to personal subscribers? Might these also be the constrained welfare optimal choices of provision modes?

In one sense, these structural questions can be viewed from the now familiar standpoint of pricing. Clearly, p_L or p_S can be set high enough to drive to zero library or personal subscription demand. However, this view obscures the causal economic forces. Indeed, the very form and interpretation of the ψ function changes with the provision modes generated by the changing levels of p_S and p_L. There are several cases to consider.

First, suppose p_L were set well above the willingness to pay of all library populations. Then, of course, $N^L = 0$ and $N^L_L = 0$. It follows from (20) that here $N^S_S = N^S_L = 0$. Thus, in this case, the publisher effectively faces only the market for personal subscriptions and consequently, the public good aspect of the situation is absent. By lowering p_L to the level of the maximum (over library populations) willingness to pay, the publisher gains that amount, less the marginal cost, while losing $p_S - c$ for each prospective subscriber in that library population. It is they who leave the personal subscription market in favor of utilizing the newly acquired library copy. The welfare effects are the gains, $B - T$, of each peruser who now has access to a library copy, the cost c of providing that copy, and the ambiguously signed $T - c$ of each subscriber. The profit impact of opening the library market is also ambiguous.

As p_L drops further, these processes continue with additional libraries acquiring the journal, N_L^L becoming negative and with N_S^L and N_L^S becoming positive. This is the case in which both provision modes are fully operative and the formulas (11) and (33) govern the optimal prices.

Only the library mode is operative when p_S is set above the reservation prices of all agents. In this case there are no personal subscribers and no potential subscribers using the libraries. The profit maximizing publisher sets the monopoly level for p_L, viewing the libraries as the only effective market.

As p_S falls to the level of the largest B in the population, two different cases can occur. If the agent with the maximal B has $T > B > c$, then he will purchase a personal subscription, whereas previously, when p_S was higher, he was neither purchasing nor using the library. In this case, both profits and welfare unambiguously increase with the opening of the personal subscription market. At such a set of prices, the library and personal subscription markets are both operative, although decoupled from one another. This is so because there are no potential subscribers, and hence, from (15), $N_S^L = N_L^S = 0$.

If, instead, the agent with the maximal B has $B > T$, $B > c$, then the reduction in p_S to just below the level of his B does not induce him to switch from library use to a personal subscription. Yet, his willingness to pay for the library copy is diminished. This can cause the set of subscribing libraries to shrink, an unfortunate eventuality for both welfare and profits. However, as p_S falls further, new personal subscribers appear and both the welfare and profit effects are ambiguous.

Hence, little can be said at this level of generality about the welfare or profit preferability of the diverse market structures we have identified. To investigate the question of whether the welfare and profit rankings of the different market structures agree, and, further, to gain insight into the economic causes of such disagreement, we have resorted to a class of numerical examples.

The mathematical model used in the simulations is a simplified version of the one employed in Sections I and II. Production cost is $\phi + cQ$. We assume that, in the B,T space, agents are uniformly distributed over a parallelogram. Their benefits from reading lie between zero and B^{max}. B^{max} is finite and greater than the constant marginal cost c of producing a journal copy. Agents with some particular value of B have inconvenience costs uniformly distributed between $T_0 + \alpha B$ and $T_1 + \alpha B$. The parameter α, constrained to be between zero and one, reflects the dependence on B of the mean conditional inconvenience cost. If, for example, α were zero, the mean inconvenience cost would be independent of the value of B. The assumption that α does not exceed one is introduced so as to ensure that at least for some values of personal subscription prices there will be library readers. Figure 2 depicts the special assumptions made about

the distribution of benefits and inconvenience costs. One shortcoming of the uniform distribution is that with it we cannot generate the interesting case of market decoupling in which both N^L and N^S are positive but $N^L_S = N^S_L = 0$.

In order to simplify calculations even further we assume that all libraries are identical, characterized by the same histogram function $h(B,T)$. As a consequence of this homogeneity, we cannot use the formulae derived from (11) to calculate the profit-constrained welfare-optimal personal and library subscription prices. Given p_S, the willingness to pay and, hence, p_L are uniquely determined. Thus, it is no longer possible to simultaneously satisfy the first-order conditions and the profit constraint. However, in the mixed case, when both subscription markets are opened, the constrained welfare-optimal personal subscription price, p_S^*, is the smallest $p_S \geq c$ which allows the resulting profits, including p_L, to be nonnegative. The welfare-optimal mode of provision of the journal is then obtained by comparing the level of total welfare at $p_S = p_S^*$ and $p_L = WP$ with that attained when p_S is set at the average cost and no library copies are provided. In all the calculations, social welfare is measured as the difference between the total gross benefits accruing to readers and the total production costs.

In the simulations we use as a benchmark the case in which provision of both personal and library subscriptions is optimal for profit maximizing publishers as well as for welfare maximizing publishers. A profit maximizng publisher will be in this mixed provision mode if and only if at least some agents with the maximum value of B have inconvenience costs higher than this B. The mixed mode is welfare optimal if the total willingness to pay (for the library copy) of agents with $T < c < p_S$ exceeds the sum of the marginal cost of the copy, c, and the fixed cost, ϕ.

Working from the benchmark situation in which the mixed mode is preferred by both types of publishers, we investigate whether other configurations of rankings of the market structures can be generated by suitable changes in the values of the parameters B^{max}, T_0, T_1, α, c and ϕ.

The striking result is that, for some parameter values, the welfare and profit rankings of provision modes are diametrically opposed. Profit maximizing publishers would sell only to libraries, while constrained welfare maximization requires that only personal subscriptions be sold.

This extreme scenario is caused by two fundamental properties of the distribution of agents. The first is the small willingness to pay of those who would patronize the library when p_S is set at c (or as close to c as possible) by the welfare optimizing publisher. This can be the result of only a small number of agents having $T < c$, or of

a tight positive association between B and T ($B \simeq T$ so that $B-T \simeq 0$) of those with $T < c$. In such cases, welfare is served by foregoing library provision of the journal.

The second critical property is the lack of a strong positive association between the B's and T's of the high B agents. With many agents having a large B - T, the aggregate willingness to pay is large, in the absence of a personal subscription alternative. The publisher is able to appropriate all of this surplus via the p_L collected from the perfectly purveying library. If, however, personal subscriptions were to be offered, then the willingness to pay of the high B, low T, now potential subscribers would be diminished from B - T to p_S - T. The counter-balancing profit increase arises from the high B, high T agents whose new contribution to profit as a personal subscriber, p_S - c, is larger than the old willingness to pay, max(B-T, 0). The profit losses outweigh the gains, and the profit maximizing mode is library subscriptions only, if there are more high B-low T than high B-high T agents.

These two properties of the distribution of agents can be generated in our simple model by setting T_0 close to c, α small, and B_{max} large relative to T_1. Less delicacy is required to generate the case in which welfare prefers both modes while profit maximization excludes private subscriptions. It is also possible to generate the case in which, due to a strong positive correlation between B and T, profits are maximized by the exclusion of library sales.

Numberical simulations confirm our expectations that different provision modes may emerge from profit and welfare maximization. It is therefore important to know whether the loss in social welfare from the presence of monopoly can be significantly diminished by constraining the monopolistic publisher to the socially optimal mode.

Governmental intervention into the structure of provision modes is desirable whenever the mixed mode is socially preferred, while the profit-maximizing provision is restricted solely to individual subscribers. In this case, there can be a significant gain in welfare resulting from the establishment of proper provision modes, even though the profit-maximizing firm will not charge the welfare optimal personal and library subscription prices. Simulations show that without libraries, at profit optimal personal subscription prices, social welfare is approximately one-third of the maximum welfare attainable under the mixed mode. If the monopolist is constrained to operate within the mixed mode, social welfare increases, often up to 70 percent of the maximum attainable level. The reduction in profits that results from the constraint imposed on the profit-making publishers is, in most cases, substantially less than the improvement in consumer welfare.

Unfortunately, however, regulation of the provision mode offered will be ineffectual in the most intuitively plausible case of profit maximization excluding personal subscriptions while welfare optimization requires both provision modes. Here, to satisfy a mixed mode constraint, the profit oriented publisher need only set p_S low enough to attract a few personal subscribers. The welfare effect of opening such an unattractive market would be minimal.

Curiously, simulations reveal the possibility of perverse effects of mode regulation. If a profit maximizing firm which desires to exclude personal subscriptions is forced into the welfare optimal mode of excluding library sales, it may then set its profit optimal p_S so high that all welfare gains from proper structure are thereby nullified. Thus, the partial correction of a market distortion through regulation of the provision structure may worsen, rather than improve welfare.

V. Welfare and Profit Effects of Library Usage Fees

In this section we study the economic impact of the imposition of a fee for the use of library journals. We maintain our underlying assumption that the journal is an excludable public good, so that the marginal cost of usage in a library is zero. Nonetheless, it is conceivable that a positive usage fee (greater than the associated marginal cost) is both welfare and profit desirable. This is so because such a fee would discourage library use, and, in the previous section we uncovered instances in which the very existence of library subscriptions was baneful to profits and welfare.

When the usage fee is paid to the journal publisher, it can be interpreted as a royalty payment to the owner of the copyright. Thus we feel that our analysis can illumine the current debate over the appropriate extent to which copyright law should apply to library use. We find that, under weak and plausible conditions, a positive usage fee is indeed optimal when welfare is maximized subject to the profit constraint. Further, under these conditions, without a profit constraint, the introduction of a usage fee, accompanied by an appropriate change in p_L, will increase both profits and net welfare. Moreover, if a profit maximizing publisher is given the right to charge a small use fee, then there exist accompanying reductions in p_L and p_S under which both profits and consumer welfare increase. However, it must be recognized that such adjustments in p_L and p_S are not necessarily in the interest of the publisher.

It is straightforward to incorporate a usage fee, p_u, into our model. With a library available, an agent will purchase a personal subscription if $B > p_S$ and $p_S < T + p_u$. He will be a prospective subscriber (and library reader) if $B > p_S$ and $T + p_u < p_S$. The other library readers, the perusers, are those with $B < p_S$ and $T + p_u < B$. Figure 3 pictures these regions of B, T space.

The willingness to pay of the library population m is now, given that we exclude the trivial case of $p_u \geq p_S$,

$$(34) \qquad WP(p_S,p_u,m) = \int_{p_S}^{\infty} \int_{0}^{p_S-p_u} (p_S-T-p_u)h(B,T,m)dTdB$$

$$+ \int_{p_u}^{p_S} \int_{0}^{B-p_u} (B-T-p_u)h(B,T,m)dTdB \ .$$

Its derivative with respect to p_u is minus the number of library readers. This is the function of p_S and p_u given by

$$(35) \qquad LR(p_S,p_u,m) = \int_{p_S}^{\infty} \int_{0}^{p_S-p_u} h(B,T,m)dTdB$$

$$+ \int_{p_u}^{p_S} \int_{0}^{B-p_u} h(B,T,m)dTdB.$$

The derivative of the willingness to pay with respect to p_S is still the number of prospective subscribers, now given as

$$(36) \qquad PN^S(p_S,p_u,m) = \int_{p_S}^{\infty} \int_{0}^{p_S-p_u} h(B,T,m)dTdB \ .$$

The marginal library, m*, is now the function of p_S, p_L, and p_u given implicitly by

$$(37) \qquad WP(p_S,p_u,m^*) = p_L \ .$$

Its derivatives with respect to the prices are

$$(38) \qquad \frac{\partial m^*}{\partial p_L} = \frac{1}{\frac{\partial WP}{\partial m}}, \quad \frac{\partial m^*}{\partial p_S} = -\frac{PN^S(m^*)}{\frac{\partial WP}{\partial m}},$$

and

$$\frac{\partial m^*}{\partial p_u} = \frac{LR(m^*)}{\frac{\partial WP}{\partial m}}$$

Consumer welfare, V, is now given by

$$(39) \qquad V = \int_{m^*}^{\infty}\int_{p_S}^{\infty}\int_{0}^{p_S-p_u}(B-T-p_u)h(B,T,m)f(m)dTdBdm$$

$$+ \int_{m^*}^{\infty}\int_{p_u}^{p_S}\int_{0}^{B-p_u}(B-T-p_u)h(B,T,m)f(m)dTdBdm$$

$$+ \int_{m^*}^{\infty}\int_{p_S-p_u}^{\infty}\int_{p_S}^{\infty}(B-p_S)h(B,T,m)f(m)dBdTdm$$

$$- p_L\int_{m^*}^{\infty}f(m)dm + \int_{0}^{m^*}\int_{0}^{\infty}\int_{p_S}^{\infty}(B-p_S)h(B,T,m)f(m)dBdTdm .$$

The first three terms capture the net benefits respectively of the prospective subscribers, the perusers, and personal subscribers in populations with libraries. The fourth term is the total payments for library subscriptions, and the last is the net benefits to personal subscribers in nonlibrary groups. Differentiation shows

$$(40) \qquad \frac{\partial V}{\partial p_u} = -LR^T, \quad \frac{\partial V}{\partial p_L} = -N^L ,$$

and

$$\frac{\partial V}{\partial p_S} = -N^S .$$

Here, LR^T is the total number of library readers,

(41) $$LR^T = \int_{m^*}^{\infty} LR(m)f(m)dm .$$

N^L is as previously, and

(42) $$N^S = \int_{m^*}^{\infty} \int_{p_S - p_u}^{\infty} \int_{p_S}^{\infty} h(B,T,m)f(m)dBdTdm$$

$$+ \int_{0}^{m^*} \int_{0}^{\infty} \int_{p_S}^{\infty} h(B,T,m)f(m)dBdTdm .$$

Profit now includes the revenue from the usage fees:

(43) $$\pi = p_u LR^T + p_L N^L + p_S N^S - C(N^S + N^L).$$

We are now equipped to study the welfare and profit effects of the introduction of a positive usage fee. These are reflected in the behaviors of the V and π functions at $p_u = 0$. Consider the introduction of a small p_u accompanied by a decrease in p_L which exactly compensates the users of the marginal library. Together, these price movements leave the set of subscribing libraries unchanged. The ratio of such price changes is computed from (38) as:

(44) $$\left.\frac{dp_L}{dp_u}\right|_{m^*} = -\frac{\partial m^*/\partial p_u}{\partial m^*/\partial p_L} = -LR(m^*) .$$

The resulting rate of change of profit can be calculated from (43) and (38) to be

$$(45) \qquad \left.\frac{\partial \pi}{\partial p_u}\right|_{m^*} \equiv \frac{\partial \pi}{\partial p_u} + \frac{\partial \pi}{\partial p_L}\left(\left.\frac{dp_L}{dp_u}\right|_{m^*}\right) = LR^T - LR(m^*)N^L + A$$

where

$$(46) \qquad A = (p_S - c)\int_{m^*}^{\infty}\int_{p_S}^{\infty} h(B, p_S, m) f(m)\, dB\, dm \ .$$

With $p_S > c$, $A \geq 0$, and $\left.\frac{\partial \pi}{\partial p_u}\right|_{m^*}$ will be positive under the plausible condition that

$$(47) \qquad LR^T/N^L > LR(m^*) \ .$$

This just says that the number of journal readers in the marginal library is less than the average number of journal readers in the subscribing libraries.

The effect of the compensated change in p_u on net welfare is

$$(48) \qquad \frac{\partial (V+\pi)}{\partial p_u} + \frac{\partial (V+\pi)}{\partial p_L}\left(\left.\frac{dp_L}{dp_u}\right|_{m^*}\right) = A \ .$$

Equation (46) shows that this is positive if $p_S > c$ and if there are any potential subscribers with $\bar{I} = p_S$. These agents are indifferent between library use and subscription purchase at $p_u = 0$. When p_u is increased, they are induced to buy personal subscriptions, with no welfare loss. However, these new purchases increase profit by A. Thus, given that $A > 0$, net welfare can be strictly increased by implementing a positive usage fee. Moreover, given the likely condition (47), the same set of price changes will also increase the publisher's profits.

Here, the potential increase in net welfare from the introduction of $p_u > 0$ is driven by the increase in profit. However, if society grants the right to levy a usage fee to a profit maximizing publisher, then there are accompanying decreases in p_S and p_L which will result in improvements in both profit and consumer welfare. With both p_S and p_L set to maximize π at $p_u = 0$, $\partial\pi/\partial p_S = \partial\pi/\partial p_L = 0$. (45) shows that with $A > 0$ and (47) satisfied, $\partial\pi/\partial p_L = 0$ implies that $\partial\pi/\partial p_u > 0$. If $-dp_S > \frac{LR^T}{N^S} dp_u > 0$, then $d\pi = \left[\frac{\partial\pi}{\partial p_u}\right] dp_u + \left[\frac{\partial\pi}{\partial p_S}\right] dp_S > 0$. Also,

$$dV = \left[\frac{\partial V}{\partial p_u}\right] dp_u + \left[\frac{\partial V}{\partial p_S}\right] dp_S = dp_u \left[-LR^T - N^S \frac{dp_S}{dp_u}\right] > 0 .$$

Thus, there exist finite changes in p_u and p_S which increase both π and V. Similarly, it can be seen that there is a decrease in p_L which makes both the publisher and the consumers prefer a positive usage fee.

Nevertheless, it is problematic whether the profit maximizing publisher would find it in his own interest to effect these requisite price reductions if he were to be granted the right to collect a usage fee. In response to the increase in demand for personal subscriptions resulting from the newly positive p_u, the publisher may well find it profit optimal to raise p_S. He may be willing to allow m* to increase instead of lowering p_L to keep the number of library subscriptions constant. In short, consumer welfare may be lowered by allowing a profit minded publisher to charge a usage fee, even if its level is governmentally set.

In contrast, consumer welfare is improved by the introduction of a usage fee when p_S and p_L are chosen optimally for net welfare subject to the nonnegative profit constraint. To show this we view p_u as a parameter in the Ramsey maximization, and use the envelope theorem to calculate the derivative of optimized net welfare with respect to p_u at $p_u = 0$. This yields $\frac{d(V+\pi)^*}{dp_u} = \frac{\partial L}{\partial p_u}$, where L is the Lagrangian of the program, evaluated at $p_u = 0$ and at the optimal p_S, p_L, and λ. λ is necessarily positive, since, otherwise, p_S and p_L would be set equal to marginal cost and the nonnegative profit constraint would be violated. Thus, the constraint is binding at $p_u = 0$ and it will continue to be so for small increases in p_u. It follows that $\frac{d\pi^*}{dp_u} = 0$ and $\frac{dV^*}{dp_u} = \frac{\partial L}{\partial p_u}$. With $p_u = 0$, recalling (46),

$$(49) \quad \frac{\partial L}{\partial p_u} = -LR^T + (\lambda+1)\left[LR^T - (p_L-c)\frac{\partial m^*}{\partial p_u} f(m^*) + (p_S-c)PN^S(m^*)\frac{\partial m^*}{\partial p_u} f(m^*) + A\right] .$$

At the Ramsey optimum,

$$(50) \quad \frac{\partial L}{\partial p_L} = -N^L + (\lambda+1)\left[N^L - (p_L-c)\frac{\partial m^*}{\partial p_L} f(m^*) + (p_S-c)PN^S(m^*)\frac{\partial m^*}{\partial p_L} f(m^*)\right] = 0.$$

Multiplying (50) by $LR(m^*)$ and subtracting from (49) does not affect the value of $\frac{\partial L}{\partial p_u}$. Then, (38) yields

$$\frac{\partial L}{\partial p_u} = \lambda[LR^T - N^L LR(m^*)] + (\lambda+1)A .$$

This is strictly positive, given (47), since we showed in Section II that with $p_u = 0$, the Ramsey optimal p_S is greated than c, and this suffices for $A \geq 0$. Hence, comsumer welfare is strictly improved by vesting publishers with the right to levy usage fees, under the proviso that library and personal subscription prices are set to maximize net welfare subject to a profit constraint.

Let us review the insights for public policy gained in this section. Overall, we find that a positive copyright usage fee is an instrument which is desirable for net social welfare when properly employed. In particular, net welfare can be increased by the extension of copyright protection to the use of journals in libraries if the library subscription price is simultaneously reduced so as to maintain the set of subscribing libraries. These same price changes also raise publisher profit if the number of readers in the marginal library is less than the average number of library readers. This gain in profit is caused by the shift of marginal prospective subscribers into personal subscriptions which are priced above marginal cost. There are also counter-balancing (around $p_u = 0$) effects on consumer welfare and profit due to the usage fee payments.

Further, we have shown that a usage fee is a beneficial instrument in the hands of a welfare minded price setter. Specifically, consumer welfare is increased by the introduction of copyright protection to library journals when the subscription prices are chosen optimally for net welfare, subject to a breakeven profit constraint. It can be conceivably argued that nonprofit journal publishers do, in fact, seek to set prices in this way. Then, for this major category of publishers, our results may be interpreted to recommend library usage charges.

For profit maximizing publishers, moreover, the introduction of a copyright fee can increase both consumer welfare and the level of profits. However, this improvement in consumer welfare is predicated upon the implementation of concomitant reductions in the library and/or personal subscription prices. Such price reductions will not, in general, be profit optimal, although, accompanied by the new usage fee, they will result in higher profits than were previously attainable. The challenge for public policy is to develop an institution which will tie the consumer beneficial price reductions to the profit improving copyright protection. The present analysis shows the existence of such a compromise pricing package which will benefit both publishers and readers.

APPENDIX 1

The Ramsey Suboptimality of Perfect Purveyance of Excludable Public Goods

In Section V we showed that full Ramsey optimality requires a positive usage fee. This is not too surprising since we are accustomed to Ramsey optimal prices being above the corresponding marginal costs, and here the marginal cost of an additional library reader is zero. The usual reason for this result is that with increasing returns to scale in production, prices must generally be above marginal costs for revenues to cover total costs.

Here, we show that perfect purveyance of excludable public goods is Ramsey suboptimal for a new and different reason. We consider a rule that each library must finance the proportion α of the subscription price p_L by means of a use fee whose size then varies over libraries:

$$p_u(\alpha,m)LR(m) = \alpha p_L \ . \tag{A1}$$

Under this regime, with $\alpha > 0$, the library does not perfectly purvey the noncongested journal copy, and the use payments do not contribute directly to cover the publisher's total costs. Yet, we shall see that the Ramsey optimal value of α is positive. The sole effect of the introduction of a positive α is to raise profit by the mark-up on the personal subscription sales to the former marginal potential subscribers. Because the profit constraint is binding, this profit increment enables p_S and p_L to be lowered, bringing profit back down to its previous level, and increasing consumer welfare.

To establish this result, we note first that given (A1), m^* is implicitly defined by

$$WP[p_u(\alpha,m^*),m^*] = p_L(1-\alpha) \ . \tag{A2}$$

Differentiation yields

$$\frac{dm^*}{d\alpha} = \frac{\left[- \frac{\partial WP}{\partial p_u} \frac{\partial p_u(\alpha,m^*)}{\partial \alpha} - p_L \right]}{\frac{\partial WP}{\partial m} + \frac{\partial WP}{\partial p_u} \frac{\partial p_u}{\partial m}} \tag{A3}$$

As before, $\partial WP/\partial p_u = -LR$, and, from (A1), at $\alpha = 0$, $\partial p_u/\partial \alpha = p_L/LR$. Substituting these facts into (A3) gives, at $\alpha = 0$,

(A4) $$\frac{\partial m^*}{\partial \alpha} = 0 .$$

The derivatives of consumer welfare, V, with respect to α, at $\alpha = 0$, can be calculated from (39), recognizing that now p_u is the function of both α and m given by (A1).

The calculation shows that, at $\alpha = 0$,

(A5) $$\frac{\partial V}{\partial \alpha} = 0 .$$

Profit is now simply $\pi = p_S N^S + p_L N^L - C(N^S+N^L)$, where N^S and N^L are given by (42) and (5), again remembering that (A1) and (A2) give new interpretations to p_u and m^*. Here, in view of the critical (A4), calculation shows that at $\alpha = 0$,

(A6) $$\frac{\partial \pi}{\partial \alpha} = \int_{m^*}^{\infty} \frac{\partial p_u(0,m)}{\partial \alpha} \int_{p_S}^{\infty} h(B,p_S,m)f(m)dBdm$$

$$= p_L \int_{m^*}^{\infty} \frac{1}{LR(m)} \int_{p_S}^{\infty} h(b,p_S,m)f(m)dBdm \geq 0 .$$

Applying the envelope theorem, as in Section V,

$\frac{dV^*}{d\alpha} = \frac{\partial L}{\partial \alpha} = \frac{\partial V}{\partial \alpha} + (1+\lambda)\frac{\partial \pi}{\partial \alpha} \geq 0$. This inequality is strict whenever there are any marginal prospective subscribers in any of the subscribing libraries. In this case, Ramsey optimized net or consumer welfare is strictly increased by the imposition of a positive α.

It is interesting to note that each library population would prefer to circumvent the positive α rule and to pay p_L solely out of the lump sum taxes characteristic of perfect purveyance. However, each library population benefits from the decreases in p_S and p_L which results from collective adherence to the rule.

APPENDIX 2

Multidimensional Characterization of Library Populations

Throughout the paper, we have characterized library populations by the scalar m, and have assumed that the willingness to pay is increasing in m. This is an overly restrictive formulation which, however, finds frequent use in the literature. Here we show how the model can be considerably extended to allow for a multidimensional characterization of library populations, without at all affecting the power of the one-dimensional approach.

Let each library population be characterized by the vector $m = (m_1, m_2, \ldots, m_n)$, where m_i represents the number of agents in the population m of type i. Type i agents are themselves characterized by the density function $g_i(B,T)$. Thus, the histogram function of the population m is

$$h(B,T,m) \equiv \sum_{i=1}^{n} m_i g_i(B,T) \; . \tag{A7}$$

All population specific structural functions have their analogues defined for each agent type. Thus, here, for example, we have an analogy to (3) the willingness to pay of a unit population of type i, wp_i. Then,

$$WP(m) = \sum_{i=1}^{n} m_i wp_i \; . \tag{A8}$$

A population, m, is marginal if

$$\sum_{i=1}^{n} m_i wp_i = p_L \; .$$

Because WP(m) is increasing in each component, by (A8), a population purchases a library subscription if

$$(A9) \qquad m_1 \geq \frac{P_L - \sum_{i=2}^{n} m_i w p_i}{w p_1} \equiv m_1^*(p_S, p_L, m_2, \ldots, m_n)$$

Here, we have arbitrarily chosen to normalize on m_1. Now, m_1^* plays the same central role as that played throughout the paper by m^*. Thus, for example,

$$(A10) \qquad N^L = \int_0^\infty \cdots \int_0^\infty \int_{m_1^*(m_2,\ldots,m_n)}^\infty f(m_1,\ldots,m_n)\,dm_1\,dm_2\ldots dm_n \ .$$

A specific analytic gain from this more general specification is the replacement throughout of the "number of potential subscribers in the marginal library," $PN^S(m^*)$, by "the average number of potential subscribers in the marginal libraries." To see this, calculate from (A10):

(A11)

$$\frac{\partial N^L}{\partial p_L} = -\int_0^\infty \cdots \int_0^\infty \frac{\partial m_1^*(m_2,\ldots,m_n)}{\partial p_L} f\left[m_1^*(m_2,\ldots,m_n), m_2, \ldots, m_n\right] \cdot dm_2 \ldots dm_n \ .$$

$$\frac{\partial N^L}{\partial p_S} = -\int_0^\infty \cdots \int_0^\infty \frac{\partial m_1^*(m_2,\ldots,m_n)}{\partial p_S} f\left[m_1^*(m_2,\ldots,m_n), m_2, \ldots, m_n\right] \cdot dm_2 \ldots dm_n \ .$$

Now, working from (A9),

$$\frac{\partial m_1^*(m_2,\ldots,m_n)}{\partial p_L} = \frac{1}{w p_1} \ .$$

Also,

$$\frac{\partial m_1^*}{\partial p_S} = \left[wp_1 \left(\sum_{i=2}^{n} m_i pn_i^S \right) + \left(p_L - \sum_{i=2}^{n} m_i wp_i \right) pn_1^S \right] \Big/ wp_1^2 ,$$

where we have used the fact that $\frac{\partial wp_i}{\partial p_S} = pn_i^S$, the number of prospective subscribers in a unit population of type i. Substituting (A9) into the above gives

$$\text{(A12)} \qquad \frac{\partial m_i^*(m_2,\ldots,m_n)}{\partial p_S} = \frac{\sum_{i=1}^{n} m_i pn_i^S}{wp_1} = \frac{PN^S(m^*)}{wp_1}$$

Substitution into (A11) yields

$$\frac{\partial N^L}{\partial p_L} = \frac{-1}{wp_1} \int_0^\infty \cdots \int_0^\infty f\left[m_1^*(m_2,\ldots,m_n), m_2, \ldots, m_n\right] dm_2 \ldots dm_n$$

$$\frac{\partial N^L}{\partial p_S} = \frac{1}{wp_1} \int_0^\infty \cdots \int_0^\infty PN^S\left[m_1^*(m_2,\ldots,m_n), m_2, \ldots, m_n\right] f(\cdot) dm_2 \ldots dm_n .$$

Thus, we have $\partial N^L/\partial p_S \,/\, \partial N^L/\partial p_L = \overline{PN}^S(m^*)$, the average number of prospective subscribers in the marginal libraries. When the basic model is specified this way, $\overline{PN}^S(m^*)$ replaces $PN^S(m^*)$ throughout. The same applies to all the concepts specific to marginal libraries.

FOOTNOTES

1. This debate was stimulated by the celebrated case of Williams and Wilkins v. U.S. [13]. Summaries of various arguments and positions can be found in [12].

2. For example, the analysis of Y. Barzel [1] rested on the public goods properties of the information disseminated in journals, while it ignored the public nature of library journal collections.

3. It was Ramsey [9] who first studied welfare optimal prices under such a constraint. See [2] for a cogent survey.

4. See Willig [14], for the development of this general approach.

5. Thus, throughout, we ignore distributional effects.

6. See Katzner [8] for a clear exposition.

7. See [4], for example.

8. This rule was popularized by [2].

9. S. Berg's important study of journal demand [3], overlooked this effect.

10. See Willig [14].

11. See Berg [3]. Research in progress by Y. Braunstein et al. [6] seems to indicate values of k significantly above 2.

12. See Fry and White [7].

13. These data for AER and EI are annually released publicly. The editorial offices of JPE and JET specified $N^S + N^L$ precisely, and offered estimates of N^L/N^S. While Wiley, the new publisher of QJE, refused to give any information, the editorial office offered estimates of 1975 $N^S + N^L$ and N^L/N^S.

14. This equation was estimated by Y. Braunstein [5], from a 1973 cross-section of 56 technical journals.

15. We assume here that the prices of all costly factors of journal production rose by 25 percent between 1973 and 1975. Both the Wholesale Price Index of book paper and the BLS index of printing trades wages did increase by approximately 25 percent between those dates.

16. See footnote 11.

17. Of course, the conclusions rest upon the empirically untested model, and upon the numbers presented in Table 1. We regard this as a pilot study, hopefully pointing the way towards a full blown empirical treatment of both the model and the relevant parameters. Note that (20) and (22) can be utilized to generate several testable implications of the model.

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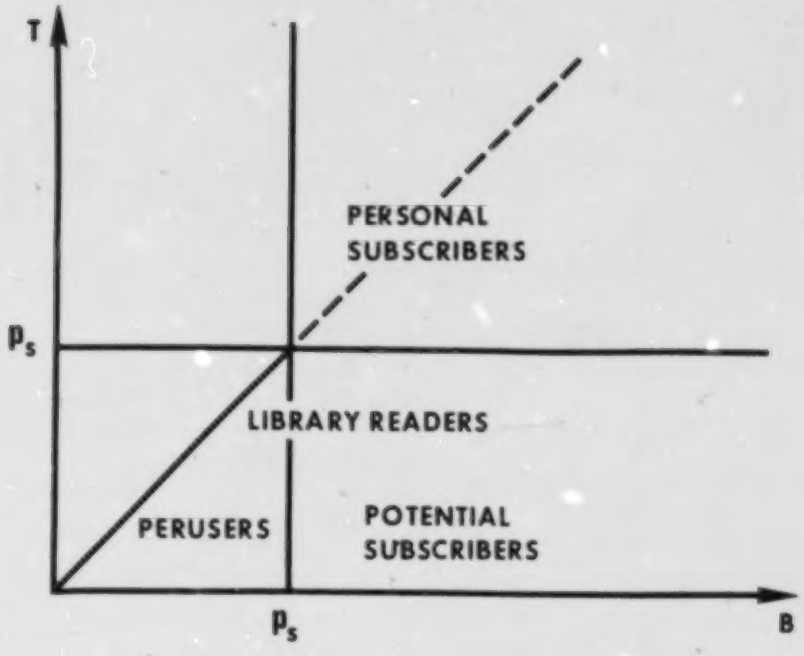
FIGURE 1


T
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p_s
LIBRARY READERS
PERUSERS
POTENTIAL
SUBSCRIBERS
p_s
B

FIGURE 2

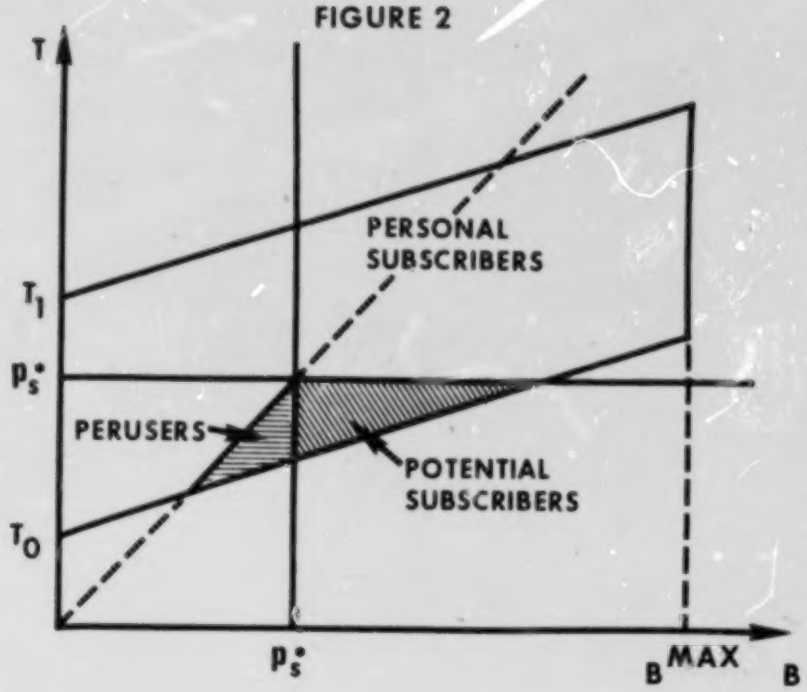
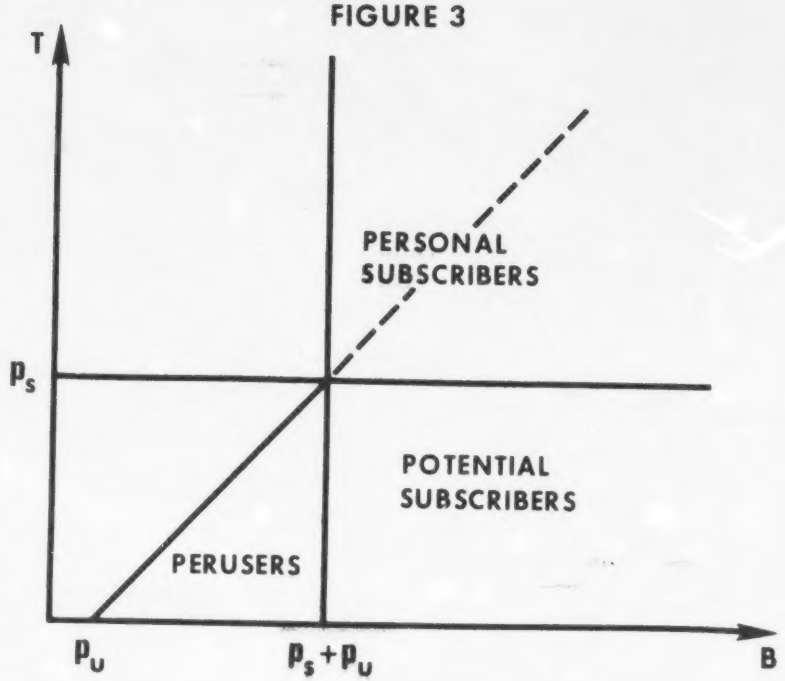

T
PERSONAL SUBSCRIBERS
T_1
p_s^*
PERUSERS
POTENTIAL SUBSCRIBERS
T_0
p_s^*
B_{MAX}
B

FIGURE 3


T
PERSONAL
SUBSCRIBERS
p_s
POTENTIAL
SUBSCRIBERS
PERUSERS
p_u
p_s+p_u
B

APPENDIX D

THE ROLE OF COPYRIGHT PROTECTION AND OPTIMAL PRICING IN COMPUTERIZED STI SYSTEMS

by

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*The views presented in this paper are solely those of the author and do not necessarily represent those of New York University.

D.1 INTRODUCTION

This paper will apply the optimal pricing considerations developed in previous papers (Braunstein and Ordover [1976] and Ordover and Willig [1976]) to hypothetical computerized STI systems. We shall examine the economic basis for the imposition of a system of prices that takes into consideration the relevant factors of supply (costs) and demand. For those price systems to be employed, it is necessary that unauthorized access to the output of such a system (to the information) be controlled. The method of exclusion of nonpayers will, in part, rely on copyright protection. The effects of optimal pricing and copyright protection on the economic welfare of society (measured by changes in producers' and consumers' surplus) will also be discussed.

D.2 BACKGROUND

In the words of Baumol and Marcus [1973], "libraries and computers may be considered two opposite polar cases among information channels from the point of view of past and prospective cost behavior." The trends in library and computer costs that they showed for the 1951-1969 period (reproduced here in Figures D.1 and D.2) have continued.

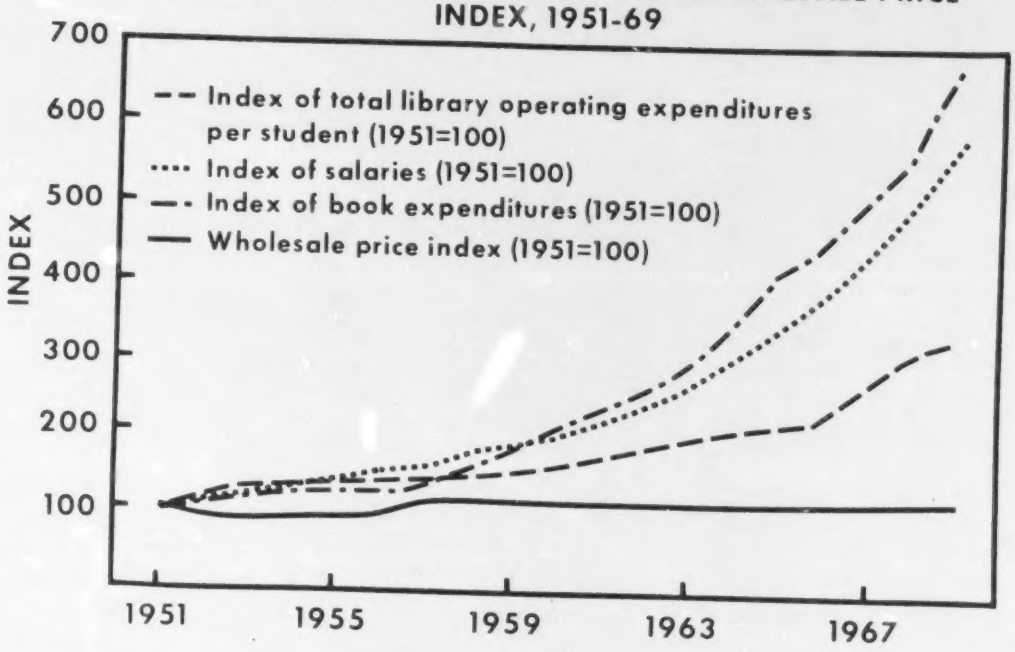
Currently certain library functions have been automated and now operate in a resource-sharing mode for groups of libraries. A prime example of this is the Ohio College Library Center which reduces unit costs by the sharing of the labor-intensive cataloging function. (See Kilgour [1972] and Hewitt [1976].) Similarly many libraries have switched to bar code label identifiers for both their collection and their users. The bar code reader is connected to a computer which processes and stores the relevant information. This system replaces the previous check-out, recall, return, and inventory systems and reduces both labor needs and costs.

Another trend in libraries has been the increasing use of a variety of microforms. The now standard-bound volume, be it a monograph or a journal, requires an inordinate amount of storage space. Even if the average "hard-copy" volume requires only 0.02 cubic feet of shelf space, a library with 200,000 volumes (not an unusual amount for a small college library) requires 4,000 cubic feet for their current collection. (This calculation ignores the shelves, aisles, space for readers, etc.) To this must be added new volumes which easily can result in a growth rate of the collection on the order of 4% per year (Baumol and Marcus, p. 8).

D.3 MODERN STI SYSTEMS

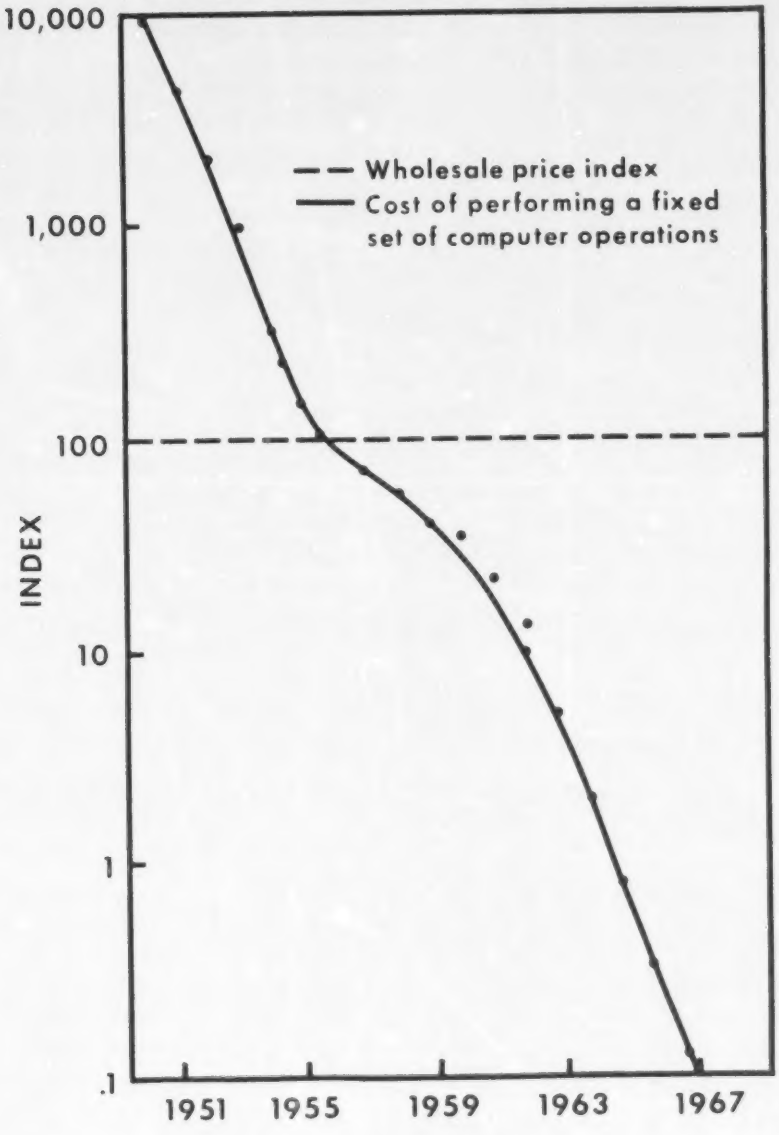
In contrast to the current library practice of purchasing, storing, and loaning "hard-copy" printed books and journals, we can envisage two alternate systems. The first of these would consist of published

FIGURE D.1
UNIT COSTS IN FIFTY-EIGHT UNIVERSITY RESEARCH LIBRARIES IN COMPARISON WITH WHOLESALE PRICE INDEX, 1951-69



Source: W. J. Baumol and M. Marcus, Economics of Academic Libraries, 1973

FIGURE D.2
COMPARISON OF COST OF COMPUTATION
WITH WHOLESALE PRICE INDEX



Source: Baumol and Marcus, op. cit.

material disseminated in the form of either electronic tapes and discs or video tapes and discs depending on the nature of the content. In this system both the library and some individuals would have the appropriate play-back equipment. One prototype here is a video disc system in which the video disc player has both addressing and "freeze" capabilities.

The second system would eliminate the distinct, loanable "volume" as we now know it. (This is in contrast to the type or disc system where a volume is one or more tapes or discs.) Such a system might involve the inputting of and storage of complete texts into a memory that is quickly and inexpensively searched either by the user himself or by the librarian as an intermediary. The recovered information can either be displayed on a CRT console or hard copy can be produced.

Neither of these two systems pose any difficulties -- conceptual or real -- for the optimal pricing rules described in our previous papers. In fact direct analogies exist for each of the concepts in those papers. The optimal prices depend on the costs of producing the information and the copies of it, the (price) elasticities of demand of each of the groups of information users for each of the products, and the cross-elasticities of demand (or, hopefully, some more operational measure of the interrelationships of the demands).

In the first system one can expect to find a higher optimal price for those copies of the discs or tapes that are sold to libraries than for those sold to individuals. This is true, in general, if the elasticity of demand of the individual buyers is higher (in absolute terms) than that of the institutional purchasers. Possibly more interesting is the conclusion of Ordover and Willig [1976] that the institutional price should be higher than the individual price <u>if</u> the average number of "potential buyers" is greater than one, no matter what the elasticities of demand may be. Here "potential buyers" are those members of purchasing institutions who would purchase their own copies if the institution switched from buying to not buying in response to an increase in the institutional price.

Also in this system, with discs or tapes, there will be an increase in economic efficiency if charges are levied for use of the library copies. This charge might vary depending on whether the use was in-house with library-provided readers, consoles, etc. or if the use were external after the copy had been borrowed. The deciding factors would, of course, be the relative costs to the library of in-house vs. external use and, again, the elasticities of demand. The only factor that should lead one to decide against such user charges would be if the transactions costs of levying and enforcing such charges were high relative to the sums involved.

The second system -- the use of computer memory and peripheral devices to store the text and access it for each user -- is also amenable to the pricing systems we have described. In such a system much more

complex pricing arrangements are not only possible but are, to some extent, already in use. For example, the contracts between the bibliographic data base providers (e.g., Chemical Abstracts, Medlars, ERIC) and the on-line information system operators (e.g., Lockheed's DIALOG and SDC's Search) often involve payments that are based on (1) yearly basic charges, (2) the length of time users are connected to the data base, and (3) the number of citations given to the users. The monitoring of the usage and output is already quite sophisticated and is relatively inexpensive.

It is optimal from the point of view of economic welfare for the data base providers to be able to charge different prices to the systems operators rather than, for instance, those they might charge to a private research organization. For such price discrimination to continue, it is necessary that some restrictions be made on further resale by the original purchaser. These restrictions are currently part of the various contracts, but, if the number of systems and producers of the information were to grow, it is obvious that at some point it is more economical to replace the individual contracts with a more comprehensive system such as a copyright licensing organization.

From this we can conclude that the growth of computerized information systems will cause copyright protection of the information to be stored in such systems to become more desirable for two reasons. First economic welfare can be improved by reducing the need for individual contracts between each producer of information and each system operator. And second, the cost of monitoring usage to determine the proper royalty payments is low in a high-technology system which relies on computer searching.

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16. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)

The findings, recommendations, and conclusions of a policy-oriented, multi-disciplinary study of copyright in computer-readable works are reported.

The foundations of copyright are examined for basic principles, and the theory of public goods is applied to develop the rationale for copyright protection. The judicial history of copyright in the twentieth century is reviewed with respect to advances in information technology. The impact of technological change on judicial decisionmaking in copyright is analyzed.

The problem of transaction costs in the marketplace for copyrighted works is examined and methods for the reduction of such costs are described. Models of policymaking are developed which clarify the roles of interest groups and the branches of Government, demonstrating their interactions and providing insights into possible futures.

Recommendations on the conditions of copyrightability for computer-readable data bases and computer programs are presented and are based on findings of basic principles developed during the study and described in the report.

17. KEY WORDS (six to twelve entries; alphabetical order, capitalize only the first letter of the first key word unless a proper name; separated by semicolons)

Computer; computer program; copyright; data base; economic efficiency; information technology; policy analysis; policymaking; public goods; technological change; transaction costs.

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